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STEEL CONSTRUCTION

Pittsburgh

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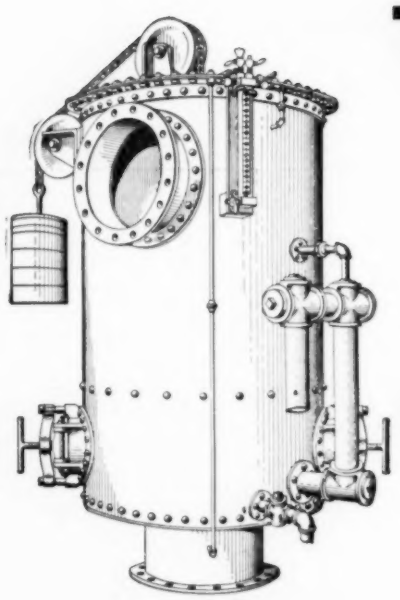

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FUTURE INDUSTRIAL PROSPECTS.

That "the little red school house" of other days has been left behind in the march of modern progress, was strikingly shown a few days ago when nearly half a hundred boys—students at the trade school connected with Public School No. 95 enjoyed as guests of the New York Consolidated Gas Company, an outing that was in effect a model joy ride with educational features.

This novel excursion was made by 45 pupils of the 7th and 8th Grades of the trade school to the gas company's repair shops, at 111th street and First avenue. The party, personally conducted by William D. Kelley, General Superintendent of Meters of the Consolidated Gas Company, left the Clarkson Street School at noon in three of the company's large automobiles. The boys were accompanied by their Principal, John E. Wade, and a number of teachers and instructors, among whom were William E. Grady, Principal of Public School No. 64, in Ninth street; J. J. Murtha, Instructor in Plumbing in the Clarkson Street School; F. Hammore, Instructor in Machine Shop Practice, and E. Rosenthal, Instructor in Shop Drawing.

Superintendent Kelly Explaining Piping Troubles.

After a joyous ride to the northern end of Manhattan, the party disembarked at the repair shops, where they were received by a delegation of gas company officials, headed by W. Greeley Hoyt, President of the Standard Gas Light Co., and Marshall Cornine, Superintendent of the meter shops. They were first conducted to the auditorium on one of the upper floors of the 10-story building, where they feasted on sandwiches and old-fashioned strawberry short cake, while the Consolidated Gas Company's orchestra, composed of men employed in the repairing of meters and other gas appurtenances, dispensed sentimental and martial airs. The students showed substantial appreciation of the refreshments, and an equally enthusiastic approval of the music, especially whooping it up when the band played Star Spangled Banner and a large American flag was unfurled.

At the conclusion of the feast the boys were taken to the company's Fitting Department School where, divided into groups of fifteen, they were shown practical points about the every-day details of the gas business. Superintendent Kelley gave the youthful students a heart to heart talk on the causes of flickering and insufficient lights, using the school's unique equipment of glass gas piping. One of the gas company instructors demonstrated how to get perfect gas flames on an ordinary gas range and on industrial burners. The students were much interested in the division of a large part of the school space into a number of apartments for lighting purposes, and the gas-piping of ordinary apartment houses was carefully explained to them. They were also shown the practical workings of gas fired steam boilers, and several air-blast gas appliances in every day industrial use. From the fitting department's school the delegation was conducted to one of the upper floors, where they were given a comprehensive idea of the construction of a gas meter, and the simplicity of its operation. The boys manifested considerable interest in this phase of the gas business, as most of them had believed that the meter, as it stood in the house, was a mass of intricate machinery. They were surprised to find the machinery so simple in construction and operation, and that it occupied but a very small space in the meter as they knew it. They were more than surprised when they learned that it took 40,000 sheep a year to furnish skins for repairing the meters in the boroughs of Manhattan and the Bronx.

From this point the boys went to the Stove Department, where all the parts of a range were explained to them, and ranges taken apart, and the various parts examined and then re-assembled in their presence.

The boys spent 2 hours in the shops, and as they formed in line and marched out to the waiting automobiles, they gave three cheers for their entertainers. Principal Wade, in leaving Mr. Kelley, said: "This has been a remarkably interesting and instructive afternoon for my boys. Nothing will do them as much good as having seen the men actually at work in the shops." Mr. Kelley said that at the conclusion of the summer vacation it was the intention of the Consolidated Gas Company to extend this same opportunity to all of the pupils in the trade schools connected with the public schools in Manhattan and the Bronx.

The boys in the trade schools of the cities are double prospects for the gas company. They may become artisians in lines in which gas fuel can be used, and therefore some early knowledge of gas possibilities is valuable; or they may be the source from which the company can recruit its fitting force or its sales' representatives.

Residence Lighting With Special Reference to Semi-Indirect Illumination.

[Read at the Seventh Meeting Pennsylvania Gas Association by MR. R. F. PIERCE.]

A very large proportion of the gas sold in America is used for residence lighting. Of the total annual sendout, roughly, one-half is for illumination, and the greater part of this is used in dwellings. The importance of retaining and expanding this business is out of all proportion to the profits directly accruing from it.

In the first place, the traditional place of gas in domestic economy is as an illuminant. Any recession from a position of importance in this service carries with it, in the popular mind, the implication that gas as a centrally manufactured form of energy is inferior to other forms, and enhances the prestige enjoyed by competitive forms of energy for other classes of domestic service.

In the second place, it is only by inculcating an appreciation of advantages of gas lighting that the complete piping of new residence buildings can be assured. In many places the number of meters per unit of population is reaching what is apparently a saturation point—at least .22 meters per inhabitant—rather more that one meter per family—can hardly be far from the practical limit. We cannot afford to rely upon increase in population for the expansion of our business, neither can we put all our eggs in the industrial fuel basket. The future development of producer gas is altogether uncertain, and it might readily take a turn that would jeopardize our industrial field. So it is apparent that ordinary business caution should impel us to conserve the future development of the domestic field by expending the use of gas in miscellaneous domestic appliances. Such a diversification can only be accomplished if facilities for the use of gas are provided in practically every room in the house; and the easiest, and in fact the only practicable, means of securing the presence of these facilities is by the vigorous exploitation of gas for lighting.

A third consideration, and of perhaps greater importance than any other, is one to which attention is rarely given and then with rather poor grace, and that is the indirect effect upon competitive conditions of the transference of lighting load from gas to electricity. It is a fundamental principle of electric central station economics that the addition of lighting business (considered by itself) demands the addition of an equal load throughout the non-lighting hours if the economical operation of the plant is to be maintained. For example, with an initial load factor of 25% an additional lighting load of 1,000 K-W (say 10,000 100 Watt tungsten lamps or their equivalent) between the hours of 6 P.M. and 9 P.M. must be offset by securing (24—3) x 1,000 x .50 = 10,500 k-w hours additional load, sometime between 9 P.M. and 6 P.M. daily if the plant is to operate at its previous load—factor and efficiency. All the lighting business that is relinquished by the gas company, and every lighting sale that it fails to obtain is just that much greater compulsion for its competitor to transfer his activities from the lighting field to spheres now occupied, peacefully and complacently, by the gas company. Whether or not our competitors are in a position to enter any great part of this field immediately with good prospects of success is beside the point. It should be remembered that the entire complexion of the industrial map may change in twenty years or even less. The point is simply this: it is "bad business" in any industry to give a competitor a greater inducement to raid undisturbed possessions, than are presented by their normal attractions. One would think that common sense alone would indicate the soundness of that argument. It is quite apparent, therefore, from every point of view, that lighting is a wing of the gas business that cannot be "turned" without the prospect of disastrous consequences.

The inclination in some quarters to take an apathetic attitude toward lighting business springs from various causes. It will be charitable to assume that the most important one is the small revenue per meter and the comparatively large consumers' investment, which results in a high sales expense. This condition is by no means peculiar to the gas industry. Our electrical competitors complain that the average residence consumer does not pay the bare cost of "readiness to serve" let alone revenue from energy. Still, they seek his business with unremitting energy and aggressiveness. One prominent central station authority says that his company makes its profits out of the energy it sells *below* 1 cent per K-W hour, and that no business above 10 cents is profitable, and yet he does not relax his efforts to secure residence lighting. We are all in the same boat as regards short-hour lighting business. The obvious thing to do is to devise means of increasing the sale of gas per meter for lighting purposes, and of decreasing such items of consumers' investment as do not directly and obviously contribute to his comfort and satisfaction.

When the tungsten lamp was introduced, many electric companies attempted to avoid the promised decrease in revenue which would have resulted from the replacement of carbon by tungsten lamps on a candle-power for candle-power basis, by urging the customer to make replacements on a watt-for-watt basis, thus getting "2½ times the light for the same money" instead of "the same light for 60% less," apparently assuming that the customer's attitude toward light was like the Chinaman's estimate of the efficiency of medicine—if a dose will do good, twice the dose will do twice the good. Unfortunately, however, the user of electricity who had all the light he needed was not inclined to purchase 1½ times more light than he could possibly use just to assist the central station to pay dividends. The customers—inconsiderate brutes—were not built that way, much to the confusion of the theories of the commercial managers, who believed that "you can put anything over if you put enough wind behind it." What actually did happen was this: The consumer of very limited means—not numerous among electric consumers of that period—replaced his inadequate lamps with ones of sufficient capacity, and perhaps effected no saving in his electric light bill; the majority of consumers effected a saving in hourly cost per lamp, but thus stimulated, extending their hours of use, relaxed vigilance in turning off lamps which were not in use, and made various extensions in the use of electricity for lighting and other purposes, which in many cases more than compensated for the saving in energy effected by the tungsten lamp. The chief direct value of the tungsten lamp to the central stations was the expansion of their field into the homes of the less opulent, which they had been unable to reach before.

In the gas lighting field a similar condition had presented itself a few years earlier, when the incandescent lamp made its appearance. The commercial conditions were not comparable, however, a large proportion of the users of gas lighting *could not afford* to provide adequate lighting by means of open-flame tips, and the introduction of the incandescent gas lamp simply enabled them to secure a satisfactory illumination at a cost within their means. Perhaps an analysis of a typical example will make the comparison clearer.

The carbon and open-flame installation in the table are based on observation of what appeared to have been fairly well planned equipments in houses of the cheaper class. The tungsten installation is based upon present day good practice among campetent architects, and the incandescent gas installation is intended to represent a *satisfactory* minimum from the point of view of quantity of light only. Probably any of the installations would be fairly satisfactory from this standpoint. A side-by-side comparison of the incandescent gas and the tungsten electric installations would be somewhat in favor of the former—very much so in some rooms.

In actual practice it develops that while the entire equipment is likely to be used in the case of the electric installations, a large proportion of gas users, finding the expense of adequate illumination by open flame tips to be beyond their means, tolerate inadequate lighting for the sake of reducing their bills.

The average open-flame installation is so designed that with all burners in use adequate illumination will be secured. It is rarely however, that all burners are lighted. Oftener it will be found that two burners on a four-light fixture, or one on a two or three-light are in use, and those only for the shortest possible space of time. The occupants of the room will huddle around the lighting fixture, where the illumination is fairly good, thus using one or two burners, where three or four would be necessary to illuminate all parts of the room satisfactorily. Thus it is likely that in actual practice considerably less than half the average open-flame capacity is ever in service.

In the case of the incandescent gas lamp it is probable that the inexpensiveness of the lighting encourages the liberal use of light to such an extent as to account for an increase of 40% or more in actual hourly service per lamp. When one finds a disposition on the part of the gas bill to remain within reasonable limits, there is a tendence to pay less attention to the turning off of lamps not immediately needed; and where ample and comfortable illumination is provided at reasonable cost, there is no inclination to go to bed at the virtuous hour of 8:30 merely to keep the gas meter under restraint. Regardless of accepted commercial theories (and commercial theories are the most futile and deceptive of all theories) the introduction of gas lighting appliances of improved efficiency into the homes of those to whom economy is an paramont consideration, is not followed by a considerable reduction of lighting bills. Where such a result is decernible the cause must be sought in other quarters.

Equipment and Total Candle Power.

Room	Size.	Electric: Carbon.	Electric: Tungsten	Open Flame.	Gas: Incandescent. 4 cu. ft. per hr. size	Gas: Incandescent. 2¾ cu. ft. per hr. size.
Living	12x14	4-60 watt 64 c.p.	4-25 watt 80 c.p.	3-7 feet 90 c.p.	1-4 feet 80 c.p.	1-2¾ ft. 70 c.p.
Dining	10x12	4-60 watt 64 c.p.	4-25 watt 80 c.p.	3-7 feet 90 c.p.	1-4 feet 80 c.p.	1-2¾ ft. 70 c.p.
Kitchen	8x10	1-120 watt 32 c.p.	1-40 watt 32 c.p.	1-7 feet 30 c.p.	1-4 feet 80 c.p.	1-2¾ ft. 70 c.p.
Bedroom	10x12	2-60 watt 32 c.p.	2-25 watt 40 c.p.	2-7 feet 60 c.p.	1-4 feet 80 c.p.	1-2¾ ft. 70 c.p.
Bedroom	10x12	2-60 watt 32 c.p.	2-25 watt 40 c p.	2-7 feet 60 c.p.	1-4 feet 80 c.p.	1.2¾ ft. 70 c.p.
Upper Hall		1-60 watt 16 c.p.	1-25 watt 20 c.p.	1-7 feet 30 c.p.	1-4 feet 80 c.p.	1-2¾ ft. 70 c.p.
Lower Hall		1-60 watt 16 c.p.	1-25 watt 20 c.p.	1-7 feet 30 c.p.	1-4 feet 80 c.p.	1-2¾ ft. 70 c.p.
Total (watts) per hour (cu ft)		960	390	91	28	19¼
Total cost per hour—Gas @ $1.00 Elec. @ .10		$.096	$.039	$.091	$.028	$.01925
Total cost per month (40 hours)		$3.84	$1.56	$3.64	$1.12	.77
Gas Pilot					.50 .75	.50 .75
					$1.62 $1.87	$1.27 $1.52

If the introduction of more efficient appliances does not decrease the total consumption of gas for lighting in dwellings of the poorer class, it cannot on the other hand be expected measurably to increase it. It is obvious, therefore, that merely encouraging or even securing the use of efficient lamps cannot be expected to lift the unprofitable small consumer into the revenue-producing class. As far as the lighting business is concerned any contribution toward improvement of conditions must come from the exploitation of lighting systems that are inefficient as to the production of illumination, but which produce an illuminating *effect* of a superior sort.

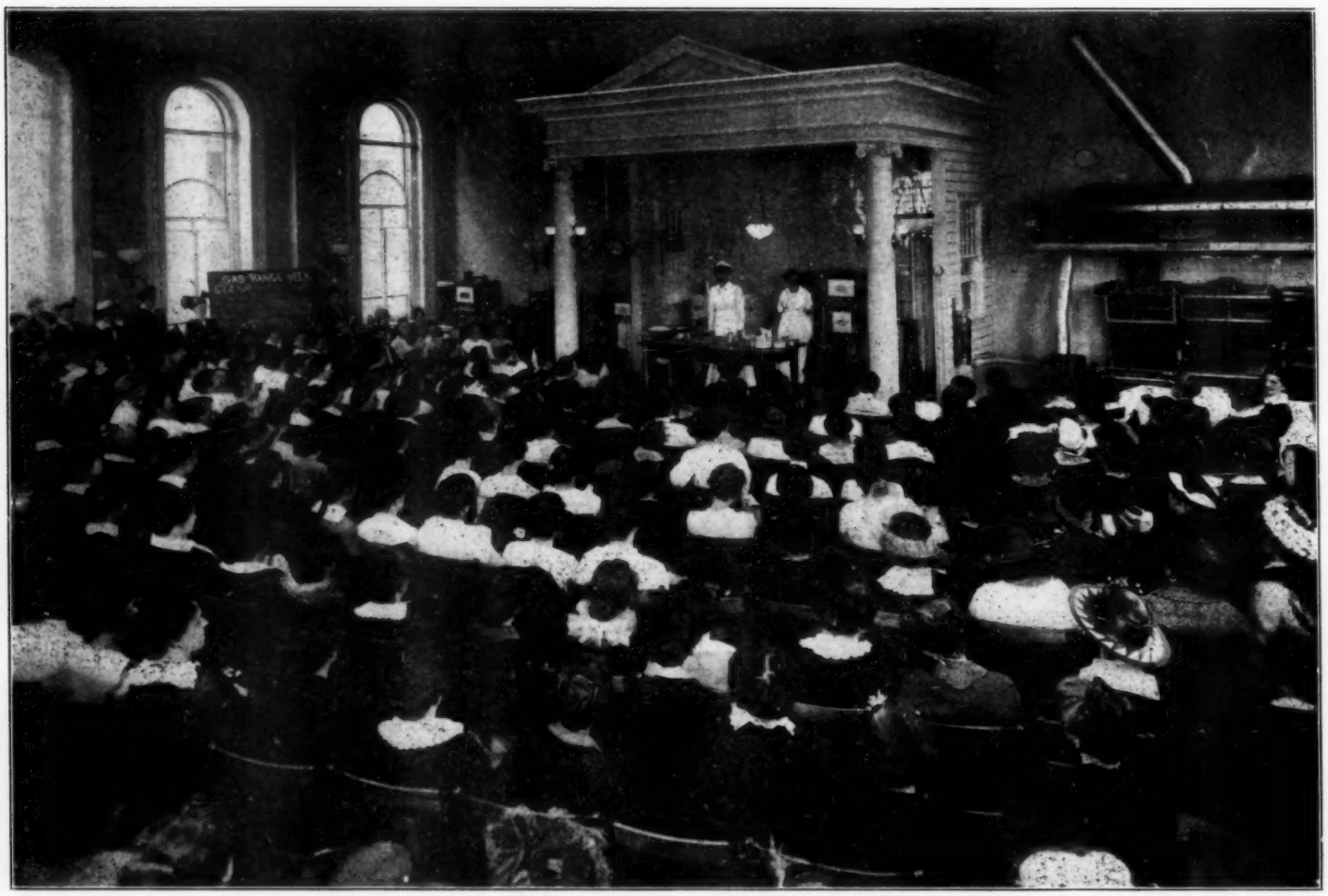
The present small revenues per customer for lighting appliances is not due to lack of appreciation of good lighting, but to a mistaken policy on the part of lighting companies. The electric companies have quite generally made efficiency in the production of illumination the prime consideration, and gas companies have followed suit, under the impression that their position in the field depended primarily upon competitive advantage in operating costs. In this way efficient service—rightly the first concern of the public service corporation—which is based primarily upon excellence of illumination, was surbordinated to what is a plausible but inferior imitation, namely, greatest quantity of light per dollar expended. The mistaken notion that these terms are synonymous is responsible for the well-intentioned but disastrous policy which has kept residence lighting in the unprofitable class, without securing the least advantage to the consumer of gas or of electricity.

As a matter of fact, the practical competitive advantage of gas with reference to electricity does not depend upon operating costs, but upon installation cost. Indirectly the lower operating cost of the gas lamp contributes to this advantage, however, because a more desirable illumination, but one physically wasteful of light, is obtainable at the same expense on account of the lesser cost of light production. The table shows this. The tungsten installation is usually designed primarily to produce adequate illumination in the lower part of the rooms; while with incandescent gas a more general illumination is sought, and units of excessive size for the requirements are often used. The operating expense of the gas installation may be materially reduced (say, by 50 cents per month) by using pilots but 4 hours per day, or even more by abandoning their use in bedrooms and halls. But even a differential of $0.50 or $0.60 per month in favor of gas would not long withstand the assaults of an aggressive salesman unless other factors assisted. These other factors are the expense of wiring, adequacy of illumination and the lower brightness of the gas mantle compared to the electric filament, resulting in a diminished glare from glossy surface (such as calendered paper). It is matter of common experience that "gas light is easier on the eyes," which is the way the undiscriminating customer describes decreased glare. It must not be understood that the brightness of the gas mantle is so low as to eliminate glare or even to reduce it to the extent desired. The most that can be said for it is that it is considerably less obnoxious than the electric filament in this respect.

As far as residence lighting is concerned, the elimination of glare is possibly only with indirect or semi-indirect lighting. The rooms in which lighting of this character is most desirable are the living, dining and bedrooms. Let us consider the results of this change in the typical house lighted by the well known 4 cubic feet per hour inverted unit in the table. Semi-indirect lighting requires, roughly, twice as much energy as direct lighting. On this basis the tungsten-electric lighted house will consume 300 watts per hour more, making a total cost of $2.76 per month, while the incandescent gas-lighted house will consume 10 cubic feet per hour more. making a total cost of $1.76 per month without pilot, and $2.26 to $2.61 per month with pilots. The differential in favor of gas lighting is increased by 56c. per month. The two systems are now on a par as regards the excellence of illumination obtained. The gas consumer has obtained an infinitely superior lighting system, and the gas company has gained 64c. per month in revenue without any increase in fixed charges—an increase in net earnings of say 42c. per month with average holder costs and selling prices—and is in a vastly improved competative position. The physical advantages of a semi-indirect system in conjunction with the recent burner improvements, freedom from fixture arm and burner discoloration, elimination of enclosing glassware, decreased maintenance costs, and absence of carbonization—have received attention elsewhere and scarcely require consideration here. It is worth while, however, to call particular attention to the practical elimination of the "heat problem" due to the absorption and reflection of so-called "radiant heat" by the bowl.

It is, of course, impossible to make any statement of general application based upon the single hypothetical case, but this much may be said: To bring the revenues from residence lighting to the point where this business shall be sufficiently profitable to justify the attention which good service and future development demand, it is necessary to increase the amount of energy per consumer devoted to this service. It is not compatible with either the interest or the desire of the public service corporation to accomplish this through forms of inefficiency that do not result in compensating advantages. The desirable developments in lighting are therefore those in which efficient burners are utilized in the production of pleasing and decorative lighting effects, in which considerable losses of light are unavoidably incurred. The semi-indirect system meets these requirements admirably. Furthermore it has already obtained considerable vogue, resulting from the appreciation of its undeniable merits, and the public is becoming educated up to a higher plane of discrimination. The result of vigorously exploiting those lighting appliances in which mere efficiency of illumination is subordinated to hygienic and aesthetic requirements cannot fail to be salutary. The appreciation of the public is always more responsive to results than to costs.

ARE COOKING CLASSES POPULAR?



The Domestic Economy Class of the Brooklyn Union Gas Company had the largest week in its history "Gas Range Week." The attendance through the week averaged 225 per day, and on the final day there were 350 present, most of whom are shown in the accompanying photograph.

In the 3 months since the company's new auditorium at No. 180 Remsen street was completed there has been a total of nearly 2,000 enrollments in the class, and 800 graduates have been given diplomas. In addition, some of the courses have been repeated in the company's Jamaica and New Town branches, where they have had an attendance of nearly 3,500, enrollments of 800 and over 300 graduates.

The success of these courses has demonstrated to Mr. T. M. Ambler, the commercial manager, and to the officials of the company, that this work can be carried on successfully all the year round, and it will be a prominent feature of Brooklyn's educational system. A feature that should not be overlooked, is that every student attending passes through the well appointed Show Rooms of the company, and many sales can be directly traced to the interest of the students in the modern gas appliances exhibited there.

The Internal Combustion Turbine.

In the gas turbine there is one disc, with buckets upon its periphery, very much the same as the De Laval turbine. It does not revolve at anything like the same speed as the De Laval, the experimental 1,000-horse power machine running at 3,000 revolutions per minute. The machine revolves in a horrizontal plane, upon a vertical axis. Surrounding the axle of the rotor are 10 explosion chambers.

All gases expand, if they are able to, $\frac{1}{2}\frac{1}{7}\frac{1}{3}$ of their volume for every degree C. increase of temperature, and $\frac{1}{4}\frac{1}{6}\frac{1}{1}$ for every degree F. In the gas turbine an explosive mixture is burned, and the heat of combustion of the fuel creates a largely increased pressure within the explosion chambers, and the gases are expanded in the nozzles, similar to those used in the De Laval and Curtis turbines, between the explosion chambers and the rotor.

The explosion chambers are preferably ellipsoidal in form; with an outlet valve near the top, leading to the nozzle through which the gases pass to the rotor, inlets for gas and air, and a number of sparkling plugs inside each chamber. An explosion chamber is first filled with air under pressure, forced in by a pump or taken from a reservoir in which the pressure is kept at a certain figure; the air inlet is then closed, and the gas valve opened. A definite quantity of gas or oil fuel is forced in and the valve then closed. When the fuel charge has been forced in the mixture is ignited. The heat liberated by combustion raises the temperature of the contents of the explosion chamber, and the pressure rises. When the pressure has risen to a certain figure the outlet valve of the explosion chamber, which in the earliest machine was a flap valve, is forced open and the hot gases pass to the nozzle. The nozzle is conical in shape; and it is important that the expansion in the nozzle be quick, so that as little heat as possible is taken from the gases. From the nozzle the hot gases pass through the rotor, driving it in the same way as steam does. The exhaust from the turbine is assisted by a fan reduces the pressure in front of the exhaust to about 12 pounds per square inch absolute.

After releasing the hot gases the air inlet valve of the explosion chamber is again opened, and scavenging air forced through the explosion chamber through the outlet valve and nozzle. It drives out the remainder of the exhaust gases; cools the explosion chamber, the nozzle, etc., and a by-pass is provided so that it does not pass through the rotor. When the scavenging is complete the outlet valve is closed and the air fills the explosion chamber for another cycle.

The hot gases from the turbine still contain considerable heat and it is proposed to employ them to raise steam for driving the fan and the gas and air pumps.

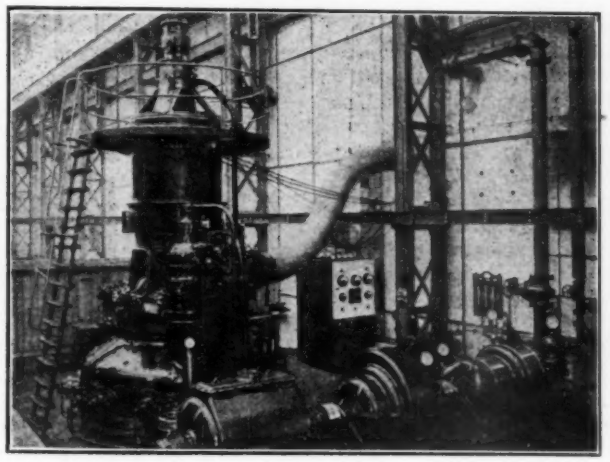
An over-all efficiency of from 20% up is claimed for the turbine. It is important that the explosion chambers be cooled before the air and gas enter. For this reason the scavanging is carried on for a considerable period, and it forms the largest portion of the

cycle. It is also proposed to use water cooling for the chambers. Each chamber delivers its charge of hot gases to the rotor in turn, just as the nozzles of a De Laval or Curtis turbine, and regulation, or variation of the quantity of gas used with varying load, can be obtained by shutting off some of them. By shutting off half the explosion chambers, for instance, the consumption of fuel should be reduced by one-half.

The combustion chamber ring for this 1,000-horse power gas turbine weighed 17 tons. the whole turbine weighing about 25 tons; the weight and area occupied by the turbine being very much less than that of a gas engine to do the same work.

A feature is made of the comparatively low pressure in the explosion chambers, which never exceeds 105 pounds, the pressure in gas and oil engines being considerably more than this.

The valves in this turbine are worked by oil pressure. A pump delivers a continual stream of oil to an oil distributor, which consists of a rotating and a stationary member, arranged concentrically. The rotating member has one aperture, the stationary member has one for each of the valves of the explosion chambers. Pressure is maintained inside the rotating member, and when its one opening comes opposite those in the stationary member, oil is delivered under pressure to the different valves in succession. The valves are held on their seats by spiral springs, and pistons force them open at the right moment.



1,000-Horse Power Vertical Gas Turbine.

It was found advantageous to have the nozzle valve seat loosely so that when fuel was first forced into the explosion chamber some passed out through the delivery valve. By allowing this leakage of air, the mixing of the gas or oil and air was more complete. When oil fuel was used, it was necessary to raise the temperature of the explosion chamber in order that the oil might not condense upon the plugs and prevent sparking.

The governing is by a hit and miss regulator and a throttle valve; the throttle actuated by oil pressure, and the hit-and-miss regulator controlled centrifugally.

It is claimed that the turbine is not subject to the same construction limits as the gas engine. One thing that has prevented the use of the internal combustion engine for very large powers has been the number of cylinders necessary. The limit of horse power per cylinder is about 2,500, though it is claimed that 3,000 to 4,000 per cylinder is possible. The difficulty is in keeping the cylinders cooled, because of the thickness of the walls there being difficulty in conducting sufficient of the heat liberated by explosion through them.

With the turbine the cooling by air scavenging can be as low as desired. There would be no difficulty, for instance, in cooling the air used for scavenging, and using warmer air when the explosion chamber is closed to receive the charge of air and fuel.

The following are some test results: With gasoline having a specific gravity of 0.746, the explosion pressure reached 105 lbs. per square inch, and mean temperature in the combustion chamber 350° C. (662° F.) A heavier motor spirit (specific gravity 0.754) gave lower pressure on explosion, and 370° C. (698° F.) Paraffin oil having a specific gravity of 0.8 gave explosion pressure from 75 lbs. to 95 lbs., and temperature of 400° C. (752° F.) Gas oil of 0.85 gravity developed about 80 lbs. and 440° C. (824° F.). Benzol, specific gravity of 0.875, gave 90 to 105 lbs. and 350° C. Tar oil of 1.05 gravity gave 80 to 90 lbs. and 400° C.

Practical Ideals.

[From an address by GEORGE OTIS SMITH, Director United States Geological Survey.]

"Practical ideals" is more than an apparent contradiction of terms—it is the real thing that the world demands. The practical ideal is the ideal in its everyday form that has the power to uplift because it is firmly braced on the ground.

Altruistic democracy is not a meaningless phrase. The Declaration of Independence begins with altruism in the appeal it makes for the pursuit of happiness. Democracy in its essence means equality of opportunity; its function is to build up to the higher plane, not to cut down to a dead level. And in our Constitution, the declared purpose to "promote the general welfare" is a guarantee that this nation takes no narrow view of business questions such as those now before the American people. It is in human welfare that ethics and economics find common ground.

Too much stress can not be placed upon the human factor in these problems. The student of politics does well to think less of artificial measures of value, to talk less of monometallic or bimetallic standards and to realise that the human standard is the real measure. Reduced to lowest terms, property, whether real or personal, gold or silver, prairie land or skyscraper, derives its value from what man's labor has put into it or can take out of it.

A working minority of American citizens have come to realize that unregulated private monopoly and good citizenship are antagonistic terms. And, now that popular clamor is giving place to sober second-thought the other side of the monoply question is receiving the consideration it deserves; there is a widespread recognition of the common interdependence of big business and the general public. On the one side, the people are realizing that they are and have been in reality silent partners in big business, and now that there has come the promise of some regulation that will in large part prevent monopolistic centralization, the people are interested in getting their share of the returns which can come only with operation at a profit. On the other hand, the managers of the large corporations, who are really the trustees of the investing public, are beginning to see that a certain financial security goes with public confidence. The public cannot be left out of the reckoning, and that well-rumored attitude toward the public so tersely expressed 30 years ago by a pioneer in railroad affairs does not pay dividends to-day.

To whom, then, belongs the reward for efficiency? I find a simple answer to that question in the opinions of the higher courts, in the decisions of public utility commissions, and in recent or pending legislation. Industrial enterprises as conducted by corporations are inherently cooperative. Owner, workman, and consumer are in reality partners. and as such deserve to share in the profits. The public demand low prices only after adequate profit has been provided for capital and fair wages for labor. This basal principal of profit-sharing among all three partners seems to me the cornerstone among the practical ideals of the present day.

The trouble with too many of the business men of the day, and especially with those who come to Washington to oppose new legislation, is their nearsightedness. They cannot see country-wide public opinion, and do not appreciate the obvious fact that the financial centers are not the centers of national thought. The result of this is that the business interests oppose something at one Congress that two years later they would accept; but the next Congress is already considering a more advanced legislative proposition. We are all more or less progressive, but the opposition has always been just one lap behind.

The bright light of publicity is coming to shine more and more upon the inner workings of all private business that has anything of the public service character. Only about 3 years ago, at a conference on water power policy, I heard the representative of the banking houses interested in hydro-electric business tell the Secretary of the Interior with considerable warmth that the one thing the men who make possible the development of our country by their contribution of capital would not stand for, was any requirement of inspection of their accounts by the government. A corporation has its rights, he continued, just as a private man in business. Last year in the same room, when the utilization of a large power site owned by the government was being discussed, I heard those asking for the permit dismiss the question of Federal inspection of their books with the remark, "That need not be discussed, our books will, of course, always be open to any authorized representative of the Government." The ultimatums pronounced by the ambassadors from Wall street, State street and West Adams

street, are shortlived in the present atmosphere of popular interest in these business questions.

We need to see ourselves and our day in the right perspective. Men of vision are what the world needs, but vision alone will not suffice. It was not a Darius Green, but Professor Langley and the Wright Brothers who taught men to fly. It is axiomatic that the world has reached the stage where science has entered everyday life to a degree that even our fathers never dreamed. Physical forces and natural resources are harnessed for the use of man, and the miracle workers who can control these Titans are essential members of the body politic.

The compelling argument for engineers to step forward as citizens, is the evident fact that politics has not kept pace with science. Take the political conditions of this or any other country, of this or any other day. They are characterized by uncertainty, confusion, and hazards that the businees man would at once cut out of his own business and should eliminate from the nation's business. On the king's highway of ancient times slaves worked without respite to make smooth the path for royal use, and to-day American rai roads invest millions to straighten curves or reduce grades; but on our pol tical right-of-way obstructions and obstacles which make all pr. gres expensive if not uncertain, are allowed to remain simply because these so-called institutions are our heritage from our fathers and our fathers' fathers.

The scientist who seeks truth simply for truth's sake will surely lose the larger part of life, for truth that serves man, science that benefits humanity, is the only kind whose quest is worth making a life-work for a man with red blood.

The most philosophic of American geologists, Professor Chamberlin, after studying exhaustively climatic conditions in the long geologic past and weighing carefully the possibilities of disaster to our earth from collision with some star, has shown that we have good reason to measure the future habitability of the earth at millions or tens of millions, if not hundreds of millions of years. Sharing Professor Chamberlin's inspiring belief in the probability of terrestial longevity, do we not gain a real incentive to scientific research into the great utilization of the forces of nature an added argument for the application of the truths of science to civic progress, and a larger faith that the Golden Age is in the future—that the highest development of our country and of the world is to be witnessed by those who will follow us? Are not our ideals practical, and is not such a vision a call to larger service?

Rented Gas Ranges.

The Consolidated Gas Company of New York has asked the Public Service Commission for the First District for a rehearing in the matter of the complaint on which the Commission two weeks ago directed the Company to modify its rules and regulations for rental of gas ranges. The order issued by the Commission provided that upon the expiration of the first year's rental of a gas range any renewal thereof might be cancelled on a thirty days' notice to the Company, and that the Company should refund the amount paid for the unexpired term of the renewal.

The Consolidated Gas Company, in its application for a rehearing, has notified the Commission that the order issued would not be accepted, and would not be obeyed. The grounds set forth were:

1. That the Public Service Commission had no jurisdiction in the matter.
2. That the evidence given before the Commission was insufficient to justify such order.
3. That the order was unjust, and unreasonable, and that it unduly interfered with the discretion of the Company's officers in the management of its affairs, and was therefore contrary to the provisions of the statute.
4. That the order was arbitrary and oppressive and confiscatory.
5. That the order was illegal and void, because in contravention of the Fourteenth Amendment of the Constitution of the United States, deprived the Company of its property without just compensation, and denied it the equal protection of the law.
6. That the rules of the Company requiring one year's rental in advance, and granting renewals to the following April first, and thereafter from April first to April first, were reasonable, just and proper rules, and were to the best interest of a majority of the Company's consumers, and to the best interest of the Company's business.
7. That the rules were adopted because about 50% of its consumers rent gas appliances in the Spring months, a large percentage occpuy what are called "cold water flats", and, upon the approach of Winter, remove the gas ranges and substitute coal ranges to heat the kitchen and other rooms in the flat. That if the order made by the Commission was enforced the Company would be put to the expense of bringing in thousands of gas ranges in the Fall of the year, cleaning, repairing and storing them during the Winter, and then putting them out again in the Spring; and this, the company contends, it could not afford to do at the rental it is now charging. Also that great confusion would result, and that the Company's business would be seriously interfered with.
8. That the average cost to the Company of installing a range is more than the amount of one year's rental; and if the order is continued in force, will be obliged either to increase its rentals for ranges, and thus throw a heavy and perhaps prohibitive burden upon a very large number of its consumers who cannot afford to pay high rentals, and to whom the rental system has been almost a necessity; or discontinue altogether the rental of gas appliances, to the inconvenience and hardship of thousands of gas consumers. It was also pointed out that the order was discriminatory, in that it favored owners of large apartment houses, who can afford to purchase gas ranges outright, to the detriment and disadvantage of a large number of small consumers, who cannot afford to purchase ranges or other gas appliances.

The attitude of the Company in the application for a rehearing lends force to the suggestion made several months ago, that the gas companies operating in Manhattan and the Bronx were contemplating to discontinue the rental system. The Consolidated Gas Company inaugurated, just twenty years ago, the renting of gas ranges and other gas appliances, and no other company in the world rents ranges or appliances of any kind. At various times companies operating in other cities have taken up the question of renting gas appliances, and investigated the system in vogue in New York City, but because of the losses and the large capital tied up, none of them have adopted the rental plan. Even in the neighboring borough, Brooklyn, gas consumers are compelled to purchase gas ranges and other gas using appliances.

Mr. Robert E. Livingston, as the representative of the gas companies in Manhattan and the Bronx, says there are no less than 420,000 rental gas appliances in those two boroughs, and at least 210,000 so-called "cookers," or small gas ranges, for which the companies charge $1 a year, or 8⅓ cents a month, in the Borough of Manhattan. The companies have about $3,500,000 invested in rented gas ranges and appliances in the boroughs of Manhattan and the Bronx. The books of the company show that each range and appliance represents a loss of $2 a year, and were it not for the fact that the companies depend upon the sale of gas the carrying of the burden of a rental system would be an utter impossibility. It cost the Consolidated Gas Company in 1914 $600,000 to regulate, repair and adjust gas ranges and other appliances, and during the year 5,000 gas appliances were lost or had strayed or been stolen.

The actual cost of installing a range is from $2.50 to $2.85. Mr. Bruch's camplaint was based on the fact that he was charged $2 for having one range substituted for another. He afterwards testified before the Commission that he did not complain of that charge, and conceded that such a charge might be made. It was established that the charge was never made where a range was defective, but only in case the inspector's report showed that the range was in good condition and where, consequently, there was no reason for making the change except the desire of the consumer for a different range. Mr. Bruch conceded the right of the company to make a lease for a year. The reason for requiring a year's lease at the outset, it was testified, is that the cost of installation could not otherwise be met, even in part. Mr. Bruch's complaint resolved itself into a demand that the company arrange its rental period so as to make leases for a year from the first of October, the period chosen by real estate owners and operators. The company contended that in the cheaper unheated tenements, the tenants through the winter months would use coal stoves, and would dispense with their gas range during that period if the leases expired on the 1st of October. The real estate interests suggest that if the leases were made for a year from the 1st of October, the gas companies would fare just as well, because the lease would ensure them a rental during every month of the year. This the gas company deny, because such tenants would not renew a lease that expired on the 1st of October, but would force the company to take out the ranges on the 1st of October, and to install them again in the spring; and, unless the company could then insist upon a lease for another year, a tenant would take a gas range for only the months of mild weather. In other words, if the suggestion of the landlord were adopted, the gas company would never, after the first year, be able to lease its ranges to about 50% of its consumers,

except for about six months in each year. This would, the company claimed, force it to abandon the leasing system altogether, or else to impose a much higher rent. For the small ranges, demanded by this class of tenants, the annual rent is only $1 a year, and the cost of installation is much more than $1. So it is obvious that if the ranges were returned in the autumn, and remained idle for six months in each year, and then again installed, the rent charged would have to be increased to a prohibitive price, and the present method would have to be abandoned.

Leases of apartments and houses were usually made for a year from May 1st, before there were such ready facilities for spending the summer in the country, and so large a portion of the population left the city for those months. If leases had continued to be made from May to May, many tenants, after the first year, would have gone into the country and, in the Autumn, would have rented a house or apartment for the winter months only. It was to prevent this loss of rent that the landlords insisted upon making leases run for a year from October 1st. The same principle that resulted in the universal leasing of residential property from the 1st of October led the gas companies to make leases from the 1st of April, the season of demand in the former case being for the winter months, and in the latter for the summer months.

The Company says the demand of the real estate agents is, in substance, that the Company shall be deprived of the privilege that the real estate agents and owners exercise; that of fixing the rental year which will insure a maximum income upon the investment in the property rented. It was said that the Companies did not make any rebate for the months when gas ranges were not in use, and the Companies asked why they should make rebates when the amount of rental is established upon an assumption of annual service. Mr. Bruch admitted that landlords did not remit in cases where the tenants did not occupy premises during the Summer months, and said that if a tenant failed to pay his rent, even though he had vacated the premises. he would be promptly sued for the amount due.

In summarizing its case, the Company said that Mr. Bruch complained because, while he saw fit to negotiate his leases from the first of October, the Gas Company preferred to negotiate its leases from the first of April, and, therefore, an owner who lets his apartment from October first, with a gas range leased to the first of April, might have to take a new lease of the range for a year from the first of April. But the landlord had nothing to complain of for the Summer months, and was not entitled to any rebate because the range is not used for he charged the tenant for the range whether it is used or not. The annual rental charges for ranges are from $1 to $6, or at the rate of 8⅓ cents to 50 cents a month; a nominal risk for the landlord, too trivial to call for serious consideration, and even this could be avoided if the landlords purchased the ranges instead of leasing them. They are not satisfied with requiring the tenants to pay for the ranges and apartments during the Summer months, even if away from the city, but ask for a regulation which will throw all renting risk upon the Gas Companies in case they are unable to find tenants for their apartments.

The practice of leasing gas ranges arose from the desire of the Gas Companies to accommodate the class of consumers to whom it would be burdensome to pay outright for a range; a class representing about 50% of all the consumers. This is not the class in whom the landlords are interested. The leasing of gas ranges was not devised in the interest of operators in real estate. There is just as much reason for owners of high class apartments to supply gas ranges as to supply gas and electric fixtures for lighting purposes, shades and awnings for the windows, paper on the walls, refrigerators, stationary tubs, etc. Moreover, to the extent that the landlords who represent the better class of consumers, may be relieved from paying for the use of gas ranges in the Winter, to that extent these less fortunate who are unable to go away in the Summer, for whom alone this leasing privilege was intended, must pay an additional rent, which would necessarily have to be charged in order to obtain a return by the Company upon the investment in gas ranges.

It is a significant fact, that should impress the Commission, that there is no complaint from consumers who hire ranges direct, and who alone are materially affected by the way the Company conducts its renting business.

There is no statuatory provision requiring Gas Companies to rent gas ranges, and even in the borough of Brooklyn no leases are made; nor are the Companies even required to sell ranges. The operating companies in Manhattan could discontinue the leasing system forthwith, and they undoubtedly will be obliged to do so if terms are imposed that would make it impossible for them to continue it.

B. T. U. Losses by Compression.

[Some of the discussion on MR. BREWER'S paper before the New England Society of Gas Engineers.]

DR. BEARDSLEY.—The New Haven Gas Light Company has made some similar tests. We have for years supplied gas to an outlying town, distant about ten miles from New Haven. At first gas was delivered to this territory under distribution pressure of about 3-inch, but in December, 1910, the supply was reinforced by a high pressure booster line carrying 2 pounds, which feeds into the low pressure system 4.6 miles from the works. This line passes over several bridges and is subject to exposure. It was thought desirable to learn what deterioration in candle power and heating value the gas underwent in midwinter, as a result of this travel and exposure. A photometer room was built in the distant town and fitted with a 100-inch bar and a standard calorimeter outfit. Tests were carried on during the winter of 1909–1910, when the gas was supplied under low pressure, and also during the winter of 1910-1911, when at least part of it had been subjected to 2 pounds pressure. Readings were taken in the late afternoon and early evening, when the consumption was greatest.

The gas was about 38% coal gas and 62% water gas. The tests in New Haven, against which comparison is made, were taken at the main office, almost a mile from the works. Tests taken at the works were higher than those at the city office.

The results are given below. Station A is the company's regular testing station at its main office; Station B the temporary testing station ten miles distant,

1909–1910.

Date	Ave. Tem.	Sta. A C. P.	Sta. B C. P.	Loss C. P.	Sta. A B.T.U.	Sta. B B.T.U.	Loss B.T.U.
Jan. 27-Feb. 14..	28.5	20.10	16.65	3.45			
Feb. 15-Mar. 16..	35.0	19.44	16.23	3.21	641.8	599.5	42.3
Mar. 17-Mar. 31..	46.2	20.34	18.27	2.07	654.7	617.0	37.7
Apr. 1-Apr. 2..	55.	20.13	19.02	1.11	649.5	630.0	19 5

1910–1911.

Date	Ave. Tem.	Sta. A C. P.	Sta. B C. P.	Loss C. P.	Sta. A B.T.U.	Sta. B B.T.U.	Loss B.T.U.
December.....	26.4	19.53	17.52	2.01	642.1	612.4	29.7
January.....	32.1	19.92	17.66	2.26	640.2	617.9	22.3
February.....	28.2	19.73	17.75	1.98	643.6	613.5	30.1
Mar. 1-Mar. 16..	33.4	19.66	17.32	2.34	639.7	610.0	29.7
Mar. 17.Mar. 31..	38.	19.86	19.58	.28	639.5	628.0	11.5
April 7.....	52.	20.89	21.52	+.63	650.0	656.0	+6.0

A few samples were collected at Station B in February, 1911, and analyzed. They show a loss of benzol vapor of about 1% as compared with the gas at Station A. A sample taken April 7th showed the same quantity of benzol in the gas at both places. In the latter part of March, the loss of lighting and heating power diminished to zero. After the 1st of April there is a slight gain, due to the fact that some of the benzol condensed out in the main re-evaporated into the gas with the coming of warmer weather. We found in this work a much greater loss than Mr. Brewer found. This is principally due to the fact that our tests were made in midwinter instead of the fall, and our gas was somewhat richer than Mr. Brewer's.

No greater loss was found the second winter, when nearly all the gas supplied had been subjected to 2-pound pressure. Comparison of the gas is here made, not against gas at the works, but against that which has already travelled about a mile, through very active trunk mains and without unusual exposure. We conclude that the effect of long travel with severe exposure to low temperature, is more serious than that of moderate compression. Theoretical considerations would point in the same direction. If we were dealing with a gas saturated at 50° with vapor of pure benzol, compression to 2 pounds would diminish the benzol present by about 12%, while cooling to 32° would diminish it by about 47%. These figures cannot be applied strictly to ordinary conditions. because the so-called benzol vapors in gas are not those of pure benzol.

In considering the necessity of delivering gas of a required quality at a distant point during the winter, it would seem of more importance to consider the effect of exposure, than of moderate compression.

MR. SHATTUCK.—In conjunction with Mr. Klumpp we made a number of experiments along this line. The general trend of our results was that the candle power loss would run nearly 30% from high compression, and the B. T. U. loss from 3 to 5%, with initials of 30 to 45 pounds and final pressures of 20 to 25 pounds; show-

(*Continued on page 330*)

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CHARLES H. WADELTON, Secretary and Manager.

SANFORD K. CAMPBELL, Editor.

NEW YORK, MONDAY, MAY 24, 1915.

Reasonableness of Standards.

Commenting on our last week's editorial note on Reasonable Standards, "Gas Man" writes us thus:

"You state that in your belief some day the 'A. G. I. Committee will succeed in getting Commissions to set standards for other reasons than because it is about the figure selected by the Commissions of other States, which is the reason generally stated as influencing the adoption of the arbitrary figure, 600 B. T. U.'

"Do you not think that in taking this attitude you are following exactly along the lines which you claim are taken by consumers in their attitude towards public utilities? In other words, are you not making broad statements against Commissions which are not founded on facts and possibly not based on belief?

"Speaking quite personally, I believe that when gas men, directly or through the journals, are willing to discuss matters of this kind without starting out in the belief that all commissions must necessarily be wrong, gas utilities will have more reason to expect and will no doubt more readily secure calm consideration by Commissions of claims put forward by such utilities for better treatment."

The following is an extract from the decision of one Commission in which it sets up a 600 B. T. U. Standard:

"We, therefore, have determined upon a single standard, which standard shall recognize and be predicted upon the heating or calorific value of the product exclusively, as best meeting the conditions. We are now confronted with the question of the measure of that standard. The scientific standard is the one that will be conductive to the greatest efficiency; efficiency of production and distribution on the part of the company; efficiency in use upon the part of the customer; as expressed by the Bureau of Standards, the delivery of the most heat to the consumer for the dollar. What is this standard expressed in British thermal units? * * *

"We find that where other State commissions have established standards to govern the calorific value of gas, the standard is in each case not far from 600 B. T. U."

Our contention is that the last quoted sentence is not the right answer to the question the Commission asks.

Dependability.

In an address to a convention of the Investment Bankers' Association of America, Mr. Rufus C. Dawes gave an outline of gas progress in this country. His subject was "The Modern Gas Company as Security for Bonds."

"As early as 1835 there were at least 6 gas plants in the United States, and the business may be considered as well established at that time. The oldest tradition of the business is to maintain an uninterrupted supply of gas. It was a proud advertisement made by the Consolidated Gas Company that 'New York City's gas supply has never failed in 87 years, and it is substantially true of all gas companies. This determination to establish a dependable service has had no small part in the development of the business, and from the start it has had many things to contend against. The inventive genius of man has exhausted itself in an effort to supply some substitute for the service it renders, but, in spite of many obstacles and contrary to many fears, the gas industry has steadily grown. The obstacles have been overcome; the fears have subsided. The industry has entered a new era, and has more than doubled its volume of business in the last decade. Invention now works for, not against, its future growth. The price at which the product has been sold has steadily declined. In New York city, for instance, the price in 1826 was $10; in 1846, $6; in 1866, $3.50; in 1886, $1.25; in 1906, $0.80. Each reduction in the selling price has opened up new fields for its use.

"Gas carries heat units in a form more available for use than any of its competitors. Whenever a new field is invaded, the genius of inventors perfects the methods of burning gas; and the demand for such inventions has only recently been felt. The response is most encouraging, and the double effect of lower prices and more efficient burners is already apparent, and supports the strongest confidence for further success in the heating field. Herein lies our future; and we are not so far as some have supposed from our great goal—the use of gas exclusively for domestic heating.

"Bonds issued by modern gas companies are secured by a natural monopoly, in the sense that their property is the only one capable of supplying exactly the same service. Moreover, under present legal adjustments, which provide for regulation and control with due regard to the protection of money invested, such property can never be duplicated or abandoned, but must be devoted to supplying this service, exclusively and perpetually. Yet these companies are engaged in the greatest of competitions—the competition of fuels. At least we have at last learned to conduct our business in this conviction: and we do believe that we can deliver the elusive and highly prized heat units in safer, cheaper, and more available form than our competitors, for an ever increasing number of purposes.

"In support of our confidence, I may submit some statistics compiled from a United States Government report relating to the gas industry. These figures are the best available, and appear to be substantially correct.

Year	Plants.	Capital.	Annual product.
1850	30	$ 6,764,000	$ 1,921,746
1890	742	258,772,000	56,987,000
1900	877	567,001,000	75,717,000
1910	1,296	915,537,000	166,814,000

"Between 1890 and 1900 the increase in capital appears, from these statistics, to be 119%, while the increase in annual gross income appears to have been only 33%. Between 1900 and 1910, on the contrary, capital appears to have increased 60% and the annual gross income 120%. The increase in the amount of capital between 1890 and 1900 was about the same as between 1900 and 1910, but the increase in income between 1900 and 1910 was five times that between 1890 and 1900. This increase in gross annual income was brought about by a reduction of 32% in the price at which the product was sold. In other words, a gradual reduction of 32% in the price of the product resulted in ten years in an increase of 120% in the gross annual revenue of an industry eighty years old, and necessitated an increase of only 60% in capatilization.

"The most interesting incident in this extraordinary accomplishment is the increase in consumption of gas for fuel purposes. It is difficult to determine these proportions accurately, but the United States Geological Survey gives figures from which it may be estimated that in 1900 the proportion of gas used for fuel was about 20% of the total, and in 1910 about 50%. From these conditions

and these tendencies may it not be safely predicted that the future of the gas industry is secured?

"As a basis for bonds, the modern gas company offers, then, these conditions: A stable income for the supply of a public necessity; an increasing income; physical property exceptionally high with relation to income, and permanently devoted to public service; moderate and not extortionate profits; a long record, excelled by none, and a present condition of growth never before experienced."

[Special Telegraphic Report.]

NATURAL GAS ASSOCIATION MEETING.

The tenth annual meeting of the Natural Gas Association of America convened in Music Hall, Cincinnati, O., on Tuesday last. When President James T. Lynn called the first session to order nearly 300 were in attendance, and Secretary T. C. Jones had made a good start on his three days of strenuous exertion.

The Mayor, Hon. F. S. Spiegel, gracefully welcomed the Association, and the response thereto was excellently given by Judge Douglass of Mansfield, O. The reading of the minutes of last year's meeting was omitted, and in succession came the reports of the Board of Directors, Secretary, Treasurer, Auditing Committee and Membership Committee. The latter presented 116 names for election as new members, and favorable action on them brought the total membership up to 941.

Then came President Lynn's address, which was closely followed and praised by all who heard it. Following the address, the Secretary read a batch of regrets from members unable to attend, and then the formal papers were started.

As per the program, the session each day adjourns at 3 P.M., so that time can be taken to view the displays in the Exhibition Hall, in which 75 booths are occupied by exhibits of appliances, etc. This year it is a particularly interesting and valuable show.

This evening, at 7:30, there were moving pictures of gas-well drilling and operating, shown in the Convention Hall, and later the boxing bouts, under the direction of the Cincinnati Boxing Commission.

H. J. Hoover, Secretary of the Union Gas and Electric Company, who had charge of the arrangements, was congratulated on all sides for his work. At none of the nine annual meetings so far held has such a convention hall been provided. For nearly two weeks stage carpenters and scene painters have been busy, and the delegates were called to order in a fairy land, resembling a conservatory on some favored estate in Southern California.

Cannot yet give you the names of the new officers or next place of meeting.—W. A. D.

SOCIETY OF GAS LIGHTING RESOLUTION ON DEATH OF FRANCIS H. HAMBLETON.

"The Members of the Society of Gas Lighting learned with sorrow of the death of their friend and fellow member, Francis H. Hambleton, which occurred on March 19th last. 'Uncle Frank,' as he was affectionately known by half the people in his native city of Baltimore, had been connected with the gas business since 1877, and with our society since 1899.

"Because of his residence at a distance from New York, he was unable in recent years to attend the meetings of our Society, but those of us who earlier were privileged to meet with him fully realized that his keen sense of humor and charming personality made him a delightful companion and insured him a warm welcome on all occasions. He leaves a host of friends and a place among them that can never be filled.

"As an engineer his ingenuity and resourcefulness were unique. He had full respect for precedent and practice, but looked upon them as guides and not as limitations. This resulted in many solutions of engineering problems that were unusual and efficient. This great resourcefulness was the result not only of natural bent, but also of early training. During the early sixties, when 30 or 40 pounds per square inch was considered a high pressure for steam, Mr. Hambleton was associated with Ross Winans of Baltimore, and assisted in the design of a complete boiler and engine plant which operated at 150 pounds. In this connection it was necessary not only to design every detail of the engine and boiler, but the valves, fittings and even the piping.

"Mr. Hambleton was connected with the Consumers Mutual Gas Company of Baltimore from the time it was built in 1877 until it became a part of the Consolidated Gas Company of Baltimore. Thereafter, until 1902, he was Engineer of the Consolidated Company. From 1902 to 1910 he was Consulting Engineer of the company. Since the latter year he has not been in active business.

"We have lost a genial companion and a good friend."

W. H. BRADLEY,
HOWARD BRUCE,
ALTEN S. MILLER,
} Committee.

TO BE READ FROM THE SKY.

The *Gas World*, London, says:

"There has been so few references to gas works in the war news that one experiences a feeling akin to pleasure on reading in the newspapers about the gas holders at Dieednhofen being painted with the new German national motto, or salutation, 'Gott strafe England.' Why, certainly! In revenge, we may suppose, for the outrage perpetrated by the English in teaching Germans how to make gas and to build gasholders. They have not long learnt the latter art; but, like so much else to which they turned their hands, they made such progress in it that at last they aimed at returning the compliment and beating their instructors at the game. This idea of converting a harmless, necessary receptacle for illuminating gas into a sort of Germanized equivalent of the Thibetan prayer-wheel is a pitiable proof that there is a superabundance of another kind of 'gas' in the country. Fortunately, the label will not hurt the gasholder nor the object of its fatuous aspiration."

[OFFICIAL NOTICE.]

Iowa District Gas Association.

DES MOINES, IA., May 6, 1915.

The Eleventh Annual Meeting of the Iowa District Gas Association will be held in Clinton, Iowa, May 26, 27, and 28.

The headquarters of the Association will be at the Lafayette Inn. Members are urgently requested to make early reservations. Mr. Thos. Crawford, General Manager, Clinton Gas and Electric Company, is Chairman of the Committee of Arrangements, and will furnish any information desired. Reservations may be made by communicating with the Lafayette Inn.

The following papers will be presented:

"Industrial Gas Problems," by F. S. Dewey.

"Industrial Appliances," by W. L. Powers.

"Iceless Refrigeration," by Malcolm F. Ewen.

"Commissions and Financing of Gas Properties," by Andrew Cooke.

Symposium of short papers on:

"How to Spend Money to Make Money in the Gas Business," by H. C. Blackwell, H. B. Maynard, G. W. Clabaugh, G. I. Vincent and W. H. Taylor.

"The Gas Company from the Consumers' Point of View," by J. H. Ingwersen, Pres., Peoples Trust and Savings Bank, Clinton, Ia.

The attention of the members of the Association is called particularly to the list of papers, which embody the most vital subjects before our industry to-day.

In addition, the following Standing Committees will report: Tar, Manufacturing, Distribution, Construction, New Business and Public Relations.

There will be a smoker and Dutch lunch on Wednesday night, a trip to Eagle Point Park, and an open air picnic meeting on Thursday, and a boat trip on the Mississippi river on Friday.

T. B. GENAY, Secretary

(*Continued from page 327.*)

B. T. U. Losses by Compression.

ing that wes hould work for a heat unit basis when transmitting gas under high pressure.

MR. HINMAN.—The most remarkable result is the very little depreciation the gas suffered in thermal units, only slightly over one-half of 1%, The variation in candle power, almost two candles and about 10.6% was about twice as great as the loss in heating power. The heating power variations were 33.2 the highest to the lowest, and the percentage 5.3. Again, the loss of benzol and illuminants given in percentages of the whole gas, would show much better if calculated as percentages of the total amount of benzol and illuminants. Calculated this way, the loss of benzol in going from Meriden to Southington was 21.7% reckoned on the total amount of benzol in the beginning. The percentage loss in illuminants was much less, 1.71%, which shows considerable loss in the benzol and little in the illuminants. The heating power fell off almost nothing.

MR. NORCROSS.—We are now in negotiation with the public utilities commission with a view to the establishment of rules and regulations for gas service, and some of our friends who are not exclusively devoted to gas, also have electrical rules under consideration. The commission undertook this work through an expert, Professor Knowlton of Trinity College, and started nearly a year ago to get ready for this schedule. He has gone into it carefully, and with a fair and open mind. We now have laid before us tentative rules with a view to provoking our discussion, and criticism. We have something which has stamped upon it the intent of fairness and reasonableness; yet when we go into the details we find a great many things we feel would be impracticable.

The proposed standard is heating power only, and for 575 B. T. U. The commission, in the course of the first meeting for discussion, suggested that they believed they made a mistake in not making it 600 B. T. U.

A committee was appointed to make it more convenient for the commission to talk things over, and the experts to confer; but the last thing the chairman of the commission said to us before breaking up was: "I want to ask you, gentlemen, particularly to consider my suggestion that this standard be made 600 instead of 575." His ground for asking that was that the figures they had showed that most of the companies had been supplying 600 or higher, and we have got to persuade him there is some real reason for making it 575.

MR. KLUMPP.—The subject of heating value is still in its infancy. We studied first the methods of testing for heating value, and I believe we have that standarized, and so specified that consistant results may be obtained. But what can be produced and transmitted is a different question. Many have the idea that the heating value of a gas can be given if the candle power is known, but this is not true.

The figures presented by the two gentlemen that spoke on this subject are interesting, but the records of individual tests cannot be used to determine conditions existing at any other plant, unless the conditions were reproduced with a gas having exactly the same chararteristics and treated the same way.

Illuminating value losses are very irregular, because you have at many times a very unstable or tender gas. The same conditions exist with heating value, but not to the same extent. If we are to give figures of loss in heating value for a gas distributed at low pressure, or high pressure, in cold or warm weather, we must know the quantity of materials used in the manufacture of the gas, the heats carried and the method of treatment during manufacture. If two water gases are made, one with efficiency of 5½ candles per gallon, and the other with an efficiency of 6½ candles, you must not expect the some losses in transmission. The same may be said of coal gas—large yields per pound and high candle power represent a gas that will not carry so well as that produced with lower yields and lower candle power. The former has a larger percentage of the benzol series, that will deposit with high pressure, low temperature and frictional scrubbing.

The quantity of these vapors that a gas will carry is dependent on certain laws of vapor tension. So if you compress a gas to 15 pounds you are putting two cubic feet of gas in the space of one foot, and if the gas was previously saturated you cannot expect to carry more than one half of these vapors. If you freeze the gas or greatly lower its temperature, you also lower its carrying capacity for these vapors.

From the figures given in this paper you will note a loss of only 3 B. T. U. The calorimeters may vary that much—only one-half of 1%—so we might say that the heating loss was negligible. It is unfortunate that the illuminating value readings were not taken at Southington, so that the loss in candle power could have been determined. But the readings would have had to be made under exactly the same conditions and with the same burner. In Mr. Brewer's paper the readings on different burners are compared so that each one may draw his own conclusions from the type of burner used. A different gas would give results at variance with these figures. The calorimeter readings would be more consistent, and when the hydro-carbon vapors are lost and a drop in heating value is noted you generally count upon a drop in illuminating value—say a loss of each 7 B. T. U. equaling a loss of one candle.

In summer you can at times transmit gas under pressure for some distance with little loss, especially if the gas contains but a small percentage of hydro-carbon vapors, but if the percentage of these vapors is high a corresponding loss will be experienced.

If we compress a 22 candlepower carburetted water gas, made under normal conditions, to say 40 pounds, and deliver 7 miles, there will probably be a loss of 6 candles and a drop in heating value of about 40 B. T. U., or say 7 B. T. U. per candle. Dr. Beardsley's figures show a loss of 10 to 12 B. T. U. per candle loss. This, to me, indicates that his candle power readings were too high at the low pressure end. The benzol and its homologues are responsible for the greater part of this loss. The vapor tension of the toluols and xylols being low, they drop out first and carry down the benzols with them. If these be all scrubbed out and the benzol alone added afterward, ordinary compression and cooling will affect the quality of the gas to small degree, as the compressed and cooled gas will carry enough benzol to hold up its illuminating value. This is an expensive method of enrichment, and at present is to be avoided.

In our argument before State or governing authorities in favor of low illuminating value gas, we should bring up the fact that what we want first is a gas that will give the best service to the consumer, and a tender gas will not give this service. The New Haven tests show that the richer gases are tender and the upper candles are not permanent. With a rich tender gas you cannot overadjust or underadjust an atmospheric burner without trouble, especially an inverted incandescent burner. In other words, the limits for good adjustment are very narrow and any slight variation in quality or pressure produces carbonizion or roaring. When such a gas is compressed and cooled and transmitted some distance, these difficulties are removed, because the higher candle power or tender part of the gas has been eliminated, or, the quantity of hydro-carbon vapors reduced, or, as an engineer has expressed it, the "trouble zone has been eliminated." This zone occurs in gas made on efficient processes, from 580 to 650 B. T. U. or higher; with coal gas of over 15 candle power, Argand; or water gas over or about 18 candle power. A gas may possibly be made of qualities above these figures containing a small quantity of hydrocarbon vapors, but such a gas would be inefficient in the use of materials, or require selected or higher price materials.

If we could supply at all times a gas of from 550 to 580 B.T.U., and make no effort for high candle power, and deliver it at good pressure, say never below 4 inches, we would never have a service complaint. A moderate variation in pressure would not cause carbonization or back firing. The Germans and English understand this, although their pressures are still too low. Their standard requirements of from 500 to 540 B. T. U have completely eliminated the trouble zone, and given the best service to their consumers.

In connection with the reports that companies make to statistical authorities, such as Brown's directory, many companies report data and results not based on the actual existing conditions, but upon supposed or assumed conditions. Something like 400 companies reported making 600 B. T. U. gas or more, and many others gave figures based upon guesses or one individual reading or test. Many of these companies never had a calorimeter test made of their gas, and report only not to show their deficiency. Give only accurate data representing existing conditions, or omit it altogether. Such reports as are now given will be and are used against you in future regulation. You must either live up to the reports you make, or state the facts, to have the requirements based upon actual conditions.

MR. ARTHUR HEWITT.—Since 1900 English engineers have been engaged in this subject very earnestly. I have the original documents containing the evidence taken in connection with certain commissions appointed by the House of Commons and the House of Lords in England on this subject of getting away from the high candle power standard and getting to a calorific basis. We have been working in Canada for four years with the government. Two years ago the Department of Gas and Electricity at Ottawa sent a

Commissioner to England for the purpose of investigating the conditions under which gas was manufactured there. He was convinced that we were right in our contention, that the candle power standard should be abolished and a reasonable standard of calorific value substituted, and when I tell you that we were working for 500 gross, 575 looks a very high figure. Unfortunately he came across the line into the United States and got somewhat mixed up. He went back inclined to steer that middle course somewhere between the chaotic confusion of standards on this side and the fixed low standard prevailing on the other side. Recently I had a number of interviews with the Government, and had the pleasure of settling the condition that compromised between the government commissioners' report and what we were asking for. I find, in a recent journal, this statement:

"Just as we go to press we have been advised by the Gas and Electricity Inspection Division of the Inland Revenue Department to the effect as follows:

'The new standard to be fixed by the Government for calorific value of the manufactured gas to be supplied in Canada, shall be not more than 540 B. T. U.'s per cubic feet, and that no company shall be subject to any penalty unless the calorific value of their gas should fall below 515 B. T. U.'s, or the average during any month falls below 525 B. T. U."

I am interested in getting protection for ourselves by not having anybody else get too far astray from the proper line. I would caution you that you do not accept offhand the report of this joint Commission, recommending 575 B. T. U.'s as a standard, because they will back down from it very shortly. The argument that has been put up for 575 to 590 by the previous speaker will lead you down to 500 B. T. U.'s, I am convinced. The recent decision in the case of the Gas Light and Coke Company in London, England, makes a standard of 540, but allows a variation of $7\frac{1}{2}\%$, which brings it down to $499\frac{1}{2}$ gross as the real standard of that company, and this discussion should weigh heavily with those who are considering this matter from the commission standpoint, with this exception: In England probably 80 to 85% of gas is coal gas and the rest carburetted water gas; in the United States almost the reverse of those figures is the case. But I am convinced that the conditions under which gas is commonly used by consumers differ so largely from the conditions that prevail in testing with the calorimeter that it has very little bearing upon the subject.

How will the consumers get the benefit of the saving brought about by the lowering of the standard? If you are able to economize in the manufacture of gas the public will eventually get the benefit of it. In Toronto they get it all. We don't, as a gas company, have any chance to profit, because we have a fixed condition as to dividend, and the public gets all the surplus; we cannot make any more money anyway. But, from a purely public standpoint, it seems to me there is nothing to be gained by getting the standard very far above 500 B. T. U's.

Three years ago we got into very serious trouble because we undertook, regardless of the fact that we had a 16-candle power standard, to carry through a winter season some experiments to see how low we could go before anyone would know the difference. Nobody would have known it if somebody on the inside had not mentioned that something was being done. We stayed with it for three months and came out all right, and I do not think anything was so impressive upon the government department as the investigation it made at that time to see to what extent the variation in the B. T. U. value of gas would affect the consumers. I went on a long way down the scale, because it was information we were after. We came to the conclusion that other people's finding did not help us very much. Supported by the arguments of the very highest grade of gas men in England and Scotland, we convinced the government that a reasonably low standard should be fixed for the gas supply, to say nothing of the necessity for competitive advantage against the lowering of electric rates. I contend that we were right and that we were working in the public interests in seeking a lower standard rather than the high standard that had prevailed for so long and which had produced so much economic waste.

MR. HINMAN.—The question of an official standard for gas has come up rather unexpectedly. Perhaps some of you gentlemen know that for 20 odd years I was the inspector for the State of Massachusetts, and had of course to look after the standard, and since that time I have given considerable attention to it. In my opinion, inspection and publicity are about all that are necessary for gas regulation. Public sentiment will take care of the rest. I am very doubtful whether it is advisable to have any standard whatever for heating or lighting value, simply inspection and immediate publicity. The gas company in any given place knows better what value it can give than any board, commission or inspector.

Straightening a Tall Leaning Factory Chimney.

[By THOMAS S. CLARK, in *Engineering News*.]

In the past many methods have been employed to bring back to the vertical position tall chimneys, shafts, towers and the like that have settled out of plumb. The procedure has often been very expensive and hazardous as well as slow; in the case of chimneys it has necessitated shutting down the boiler and a consequent loss in output of the manufacturing plant. A unique and inexpensive method was recently employed to straighten a 100-foot factory chimney in Brooklyn, N. Y., without interruption to the plant.

Under one side of the foundation the soil had softened and settlement taken place, due to leakage from a water pipe near the foot of the foundation whose existence had been forgotten. Fig. 1 shows the chimney.

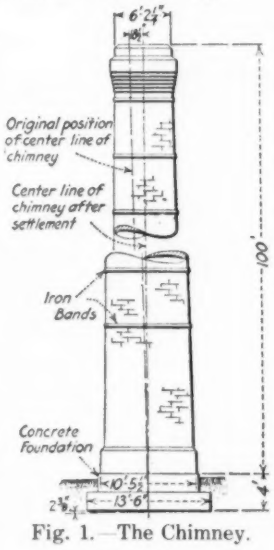


Fig. 1.—The Chimney.

To excavate on the low side of the foundation to the depth of the footing course, crib under it, and attempt to jack the structure back plumb, would have involved large cost, loss of time and not a little risk. The great weight of the 100-foot column and the additional pressure due to the leaning would have required powerful jacks and a substantial footing to jack against. There would also have been danger of cracking the unreinforced spread foundation, and additional foundation would have had to be placed before the jacks and cribbing could have been removed.

Another way to straighten a leaning chimney, employed to some extent in Europe, is to saw out with an ordinary two man saw a course—or a portion of a course—of brickwork on the side of the columns away from the direction of lean in wedge-shape, and allow the portion of the chimney above the cut to settle back. This method is, to say the least, not entirely satisfactory nor does it remedy the defect entirely, as the portion below is still out of plumb and the bearing surface of the foundation footing is not brought to the horizontal.

The chimney was in operation, so it was not possible to determine the amount of its lean by plumbing to a center on the inside. The deviation from the vertical was therefore determined with a transit by a simple triangulation; it was found to be $18\frac{1}{2}$ inches. From this figure, with the known height of the chimney, it was determined that the toe of the footing on the high side must be settled $2\frac{3}{8}$ inches on a line exactly opposite the direction of the lean. The problem was to remove just enough earth between the center of the foundation and the toe of the high side to gradually settle the foundation back $2\frac{3}{8}$ inches at the toe. Levels were taken on the high side and an indicating plumbline fastened to the side of the chimney.

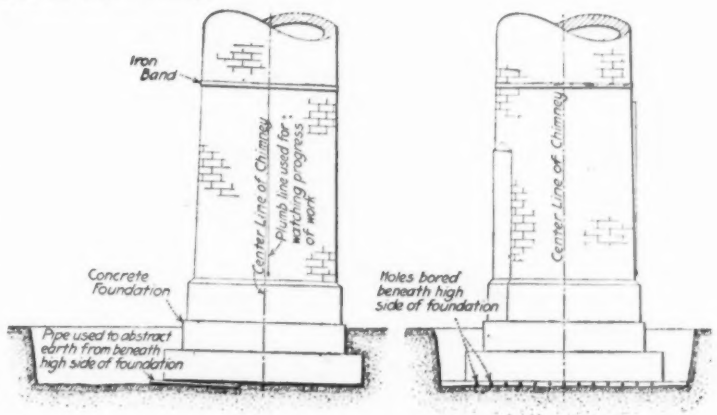

Iron Band
Center Line of Chimney
Plumb line used for watching progress of work
Concrete Foundation
Pipe used to abstract earth from beneath high side of foundation
Center Line of Chimney
Holes bored beneath high side of foundation

Fig. 2.—Method of Removing Earth under High Side to bring Chimney back to Plumb.

A trench was excavated on the high side to the depth of the foundation (about 4 feet) the length of the trench equal to the square side, and its width half the width of the foundation, or about 8 feet. Four 2-inch wrought iron pipes, 8 feet long (half the width of the foundation), were sharpened sawtooth fashion at one end, and successively driven under the high side of the founda-

tion near its center (Fig. 2), then withdrawn, and emptied of the material in them. Successive insertions were made about a foot apart, and as the pipes were withdrawn, the earth adjacent to the pipes crushed into the holes left by them.

In this way but a small quantity of earth was removed at a time, and but a small quantity gave way at a time; the yielding occurred just where wanted; and the chimney settled back gradually, with no shock and no danger. The amount of settlement, its direction, and the rapidity of settlement were always under absolute control. The telltale plumb-bob gave the direction as well as the amount of movement.

At one period of the operation, the chimney began to settle slightly out of line. It was necessary to drive the pipes more often at one certain point to bring the shaft back to line.

When the column was again plumb, the trench was filled up, the leak in the drain pipe having been stopped to prevent further softening of the earth. The chimney has since remained vertical.

Toluene Recovery Plant at Beckton, England.

[From the "London Journal."]

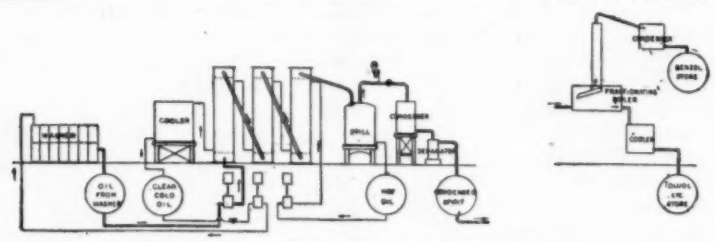
The demand for toluene for explosives found the staff of the Gas Light and Coke Company at Beckton prepared to set aside a portion of the plant to toluene extraction, with the result that for some time past 15 million cubic feet of gas have been treated daily —a quantity which will shortly be increased to 20 millions.

Research and large scale experimental work carried out during the last 2 years provided information as to the most suitable wash oil, and the quantity of oil required to extract a maximum quantity of toluol without materially reducing the illuminating power or calorific value of the gas.

By using a limited quantity of oil in the washers, very little benzene is extracted from the gas—giving an effect similar to using a larger proportion of oil with benzene added to it, as has been suggested by several investigators.

A crude spirit is obtained, rich in toluol, xylol, naphthalene, etc., and only a small quantity of benzol has to be returned to the gas, and the plant for dealing with the saturated oil is small compared with that required when more wash oil is used, and a greater proportion of the benzol removed.

Rotary and centrifugal washers are used for the absorption of the toluol by the wash oil.



The method of working (as shown by the accompanying sketch) is as follows: The cooled debenzolized oil is pumped from the cold oil store tank at a constant rate through the washer, where it meets an opposing stream of gas. From the washer, the oil containing the toluol, etc., runs into a tank, from which it is pumped through the counter current heat economizers to the still, in which the wash oil and the light spirit are separated by means of steam.

This method of separation is not unduly expensive in steam, provided the wash oil in the extraction washer is not used excessively. But as a more economical arrangement, it is proposed to make a trial of a direct heated coil.

The hot wash oil from the still flows to a collecting tank, from which it is pumped through the heat exchanges, and onwards through water coolers, after which it flows to the tank from which the extraction washer is fed. The light spirit vapors, after leaving the still, are conducted through a condenser; the condensed mixture of benzol and toluol flowing to a collecting tank after the separation of the condensed water. The mixture of sririt is rectified in a fractionating boiler, where the lighter spirit is separated from the toluol, xylol, etc., before this heavier boiling portion is sent to the products works for rectification. A yield of about one-third of a gallon of pure toluene per ton of coal conbonized is obtained.

The Small Consumer a Problem.

[Paper read by A. D. DUDLEY before Empire State Gas and Electric Association.]

The small consumer problem confronts all gas and electric companies, and I believe deserves more serious consideration than it has been given in many situations. Both branches of our business are interested in the solution of this problem, and I have treated it from both viewpoints, inasmuch as many present at this meeting represent combination companies.

The small consumer can, to my mind, be divided into two classes:

1. The consumer who is a small user of gas and electricity, and who offers little, if any, possibility of development.
2. The consumer whose monthly bill is small because he has never been shown how, or through what medium, more gas or electricity could be used to his advantage, as well as to that of the company.

The most striking example of the first class, the consumer offering little, if any, possibility of development, is found in buildings comprising small offices. Even though electricity is used as much as needed and in a diversity of ways, the consumption will of necessity always be small and in many cases would be unprofitable without the minimum bill charge which most electric companies are allowed. In such locations the consumption of gas is even smaller—in fact, is practically nothing in many instances. The gas meter is kept for auxiliary or emergency use, and is a burden of expense to the majority of companies for want of a monthly minimum or meter rental. This condition is very serious at the present time. A recent analysis of our ledgers disclosed the fact that about 10% or some 3,000 gas meters yielded us less than 50 cents a month. For the most part these meters were in offices, and rarely used, and in other places where effort to stimulate consumption would be wasted. More serious still is the fact that as the use of electricity becomes more general, the number of gas meters installed for emergency use will materially increase; and some provision whereby the unprofitable consumer can be eliminated, if not imperative, would, to say the least, be most welcome. I trust the discussion may touch on this question, as I know many companies represented here are interested in its solution.

I venture to say that any company that has not already analyzed or classified its ledgers will be surprised at the result. In no other way can the importance of the small consumer problem be brought home more forcibly, and the data obtained give just the material needed to apply practical methods for a remedy. As a result of our own analysis, we found, in addition to the above, that many more consumers were using gas and electricity in a limited way and that our small consumer list greatly exceeded our expectations. We found, for instance, that 1,500 electric consumers were using less than the minimum of $1 per month.

The field offers ample opportunity to increase yearly revenue and accomplish the desired end of changing the small consumer to one more profitable. Here every effort should be directed, as no additional investment is required in the way of line extensions; not even a new service or meter being needed. Inspection and maintenance to a limited extent will do much to increase the consumption on appliances now in use. A consumer may be a small user because many of his sockets are empty; the oven of the gas range may be out of commission for the want of new linings, and the electric iron may have been laid on the shelf for six months because of a burned-out element or a broken plug. Until our sign flashers were put under a regular maintenance system, for which the consumer gladly paid, signs were frequently out of commission and the consumer constantly irritated. Bringing these matters to the consumer's attention and aiding him to have them remedied will necessarily increase his consumption. I know of an extensive inspection campaign carried on in a large city that yielded materially in increased revenue.

Closely allied to the inspection work, and which may well be covered at one and the same time, is demonstration. This work, covered more advantageously by women, extends the use of installed appliances. Many of the pies, cakes and cookies now bought outside would be prepared at home if the cook or housewife understood better the operation of the gas range oven. It is a well known fact that thousands of broiling ovens have never been used, for lack of knowledge. The uses of an electric grill are many, and with the different fittings of a vacuum cleaner a variety of work can be done. At the time an appliance is sold it may be explained fully but a demonstration in the home after the owner has used it, often assures more extensive use.

As important as maintenance and demonstration is the sale of new appliances, which is the surest way of developing the small consumer. A discussion of this phase of the subject should bring out plans and methods that have been tried and proven effective.

Are you selling the proper appliances, and offering wide enough variety? Is your selling plan liberal enough to reach the small consumer? Are your prices right? Have you the right kind of a sales' force, and are you paying the salesman enough to warrant your expecting a more rapid development than you are getting? These questions are asked to get different views and ideas, and to learn how the other fellow has been successful in making the small consumer a larger one.

Whatever the sales' plan adopted, it is vital to know where you stand before you start, lest much time and money be wasted. It is not only necessary to know what a small consumer has, it is of greater importance to know what he has not. No industry has a better opportunity to keep in close touch with its consumers. None come in personal contact with them oftener. Granting that to a certain extent the small consumer is unavoidable in our business as well as in every other line, nevertheless we all have more of him than we should because we allow that condition to exist. The solution may be a matter of maintenance or demonstration, the adoption of an intensive sales' plan, the introduction of a new appliance, or perhaps only more courteous treatment. In any event, there is no reason why a policy of securing, developing and holding cannot be adopted and followed, that will reduce to a minimum the number of small consumers in the territories in which we operate.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,035,006. Gas Furnace and Connections for Parts Thereof. L. M. Freymuth, Los Angeles, Cal.

1,135,047. Gas Burner. B. R. Parrott, Jackson, Mich., assignor to The Parrott Heater Co., same place.

1,135,128. Friction Igniter for Gas Lamps. E. C. Meissner, Kansas City, Mo.

1,135,283. Safety Gas Burner. G. F. Herrmann, Jersey City, N. J.

1,135,398. Adapter for Bunsen Burners. J. I. Robin, London, England, assignor to Strand Mantle and Machine Company, Limited, same place.

1,135,700. Gas Oven. A. H. Kohlmeyer, St. Louis, Mo., assignor to Thermo Automatic Stove Co., same place.

1,135,840. Gas Burner. F. Oudeville, Paris, France, assignor to Societe Universelle des Appareils Controleurs, same place.

1,136,202. Automatic Cut Off for Gas Burners. V. Abbate, New York city.

1,136,717. Lighting Device for Gas Stoves. M. A. Possons, Cleveland, Ohio, assignor, to American Stove Co., St. Louis, Mo.

1,137,011. Gas Heater. T. J. McCarthy, Cincinnati, O.

1,137,520. Lighter for Gas Stoves. F. G. Nicolaus, Cleveland, O., assignor to American Stove Co., St. Louis, Mo.

1,137,529. Gas Heating Stove. M. A. Possons, Cleveland, O., assigner to American Stove Co., St. Louis, Mo.

1,137,989. Gas Lamp. J. Lederer, New York city.

1,138,416. Gas Burner. C. V. Roberts and J. W. Butler, Philadelphia, Pa., assignors to Roberts & Mander Stove Co., same place.

1,138,435. Means for Holding a Plurality of Gas Mantles. W. T. Wilson, Philadelphia, Pa.

1,138.460. Gas Scrubber. W. M. Derby, Buchanan, N. Y.

1,138,685. Water Shed for Acetylene Generators. A. S. Phelps, Chicago, Ill.

1,138,727. Pressure Control for Gas Benches. H. A. Carpenter and A. W. Warner, Sewickley, Pa., assignors to Riter-Conley Mfg. Co., Pittsburgh, Pa.

1,138,833. Incandescent Gas Burner. G. Baty, Brooklyn, and R. M. Ryan, New York, N. Y.

1,139,053. Apparatus for Neutralizing Corrosive Fumes in Gases. T. E. Murray and E. B. Ricketts, New York, N. Y.

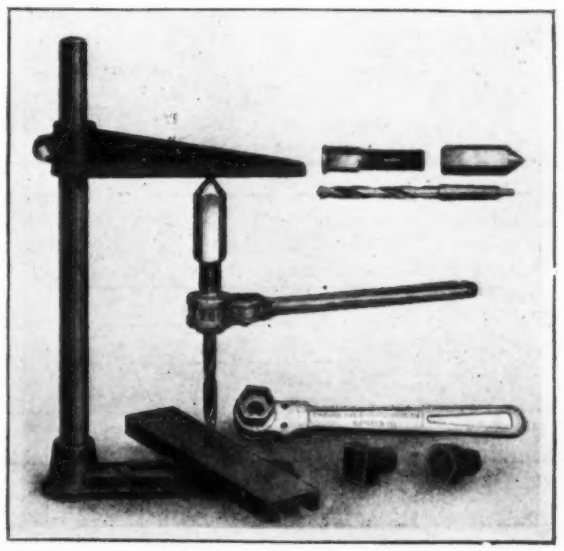
1,138,088. Coke Producing Plant. F. Tschudy, Birmingham, Ala.

1,139,208. Gas Coke. J. H. McMurray, Schenectady, N. Y., assignor of one-half to J. T. Gorman, Cohoes, N. Y.

1,139,361. Automatic Lighting and Extinguishing Apparatus for High Pressure Gas Lamps. G. Keith, London, England, assignor of one-half to J. Keith, same place.

New Methods and Appliances.

COMBINATION RATCHET WRENCH AND DRILL.—This ratchet wrench with reversible sockets is designed for work, and is convertible to a drill taking round or square taper shank drills ranging from $\frac{1}{4}''$ to $\frac{7}{8}''$ diameter.



Combination Ratchet Wrench and Drill Handling Round or Square Tools.

The wrench and drill combination is used with a drill post, as shown in the accompanying illustration. The socket fitting in the wrench is threaded on one end for feeding the drill into the work. In operation the hexagon shell pressing against the underside of the arm of the drill post is held with one hand, while the wrench is operated with the other. This causes the threaded socket to turn and force the drill downward through its 3 inches of travel. The drill post is made with a malleable iron foot and arm, and the post proper is of solid steel. The arm is 8 inches long, and can be placed 18 inches above the foot if desired. Two sizes of wrench are made, for handling nuts ranging from $\frac{1}{4}''$ to $1\frac{1}{4}''$ in size.

DETAIL ESTIMATE OF THE COST OF ONE YARD OF CONCRETE.—This estimate for a cubic yard of concrete which should be of a 1 : 2 : 4 mixture to be used for building construction, is made with emphasis on the fact that no two jobs cost the same when itemized this way :

0.9 cubic yard gravel at $1.20 per yard	$1.08
0.45 cubic yards sand at $1.00 per yard	.45
1½ barrels of cement at $1.20 per barrel	1.80
Water	.10
200 feet B. M. of lumber at $20, used four times at 20% less each time used, less 40% salvage	1.08
Reinforcement, 150 pounds per cubic yard, at 2½ cents	3.75
Total cost of material	$8.26
Labor centers 120 feet at $20	$2.40
Labor forms, 80 feet B. M., at $30	2.40
Labor reinforcement, 150 pounds, at 1½	2.25
Total labor	$7.05
General charge item, 15% of labor	$1.13
Total cost 1 cubic yard concrete	$16.44

If there is to be a surface coat applied, or a finish, its cost must be added. One item that adds very much to the cost is the form and center work. In the estimate given, cost of lumber and form and center labor is $5.88. If the work had been twice as heavy, this labor would have been only half as much per yard. This should bring home to every estimator the importance of dealing with temporary structural timber work as a separate unit. Personally the writer would rather guess at the reinforcement per cubic yard than at the cost of forms and centers. The labor cost depends on the quantity of concrete placed on the square foot of area of work covered, inasmuch as the cost of placing depends upon the distance traveled and the amount handled. The greater the distance, the less the quantity and the more cost per unit; and the less the haul the greater the mass and the less the cost per unit. Such labor cost may be anywhere to $5 a yard; and it is suggested that a careful study be given each job to determine the foot-pounds of work necessary to complete it.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Juries of Awards are now busily engaged in passing upon the various exhibits at the Panama-Pacific International Exposition. The following gentlemen compose that judging Gas Apparatus and Appliances: Paul Doty, chairman; Frank A. Cressey, Jr. vice-chairman; J. M. Morehead, secretary; L. P. Lowe, H. B. McLean. They began their work May 3d and finished on the 13th.

MR. R. C. GRAVELY, who has been moved to Eau Claire, Wis., is superintendent of underground construction for the Wisconsin-Minnesota Light and Power Company. An item two weeks ago incorrectly stated that he was manager of the Eau Claire Gas Light Company.

THE Worcester (Mass.) Polytechnic Institute will celebrate the fiftieth anniversary of its founding June 6th to 10th. President Wilson, who was the Commencement Orator 25 years ago, has expressed a desire to be present at the anniversary, and it is hoped that the pressure of public business may permit him to be in Worcester on the 9th of June. General George W. Goethals has already accepted an invitation to be present.

SECRETARY BOSTOCK advises us that the 23d annual convention of the Pacific Coast Gas Association will be held in San Francisco jointly with the International Gas Congress, from September 27th to October 3d, 1915.

DR. F. S. PEARSON, President of the Brazilian Light, Heat and Power Company, which is incorporated in Toronto, Ont., and who is identified as a large stockholder in several Mexican gas and oil companies, was one of the passengers lost on the "Lusitania." His body was recovered and identified the following day. Dr. Pearson was connected with the Pearson Engineering Corporation, which has offices in New York city.

R. B. WAGNER, representing the Washington County Gas Company, recently organized in Johnson City, Tenn., has purchased a lot on which to locate the plant, and has leased the building now occupied by the Johnson City Restaurant for a period of 8 years.

THE first step of the preliminary work on a downtown subway for Chicago, Ills., is completed by the Commission on Downtown Improvements finishing its estimate on the plan to remove all public utility subsurface paraphernalia to a gallery under the sidewalk. All pipes, wires and conduits are to be placed in one tunnel beneath the sidewalk, where they will be easily accessible without blocking traffic and tearing up a street every time a wire breaks or a pipe cracks. The commission reports that from 2,000 to 4,000 holes are dug in the streets every year to repair or renew public utility lines, blocking busy streets, ruining the pavement, and costing from $200,000 to $400,000 a year.

THE Western Gas Construction Company, Fort Wayne, Ind., has been operating its machine shops 71½ hours per week to catch up with orders.

BECAUSE the Central Hudson Gas Company removed from the home of John Gaffney of Newburgh, N. Y., the gas meter instead of the gas range (there being no money due for gas while there was money due on the range) a jury awarded plaintiff a verdict of $5, that being the amount he had expended for kerozene lamps with which to light his house after the gas was cut off. Mr. Gaffney in his complaint asked for $1,000. The case was hotly contested and contracts innumerable, with copies of notices of arrearage sent, were numerous. Decisions of the higher courts in similar matters were quoted, and the case finally concluded, but not before a motion to dismiss had been made and taken into consideration by the court.

THE Springfield (Mass.) Gas Department will add an additional lift to its smaller holder, which now has a capacity of 60,000 cubic feet.

F. P. ROYCE, president of the Blackstone Valley Gas and Electric Company and vice-president of the Stone & Webster Management Association, was the principal speaker at the last meeting of the Woonsocket (R. I.) Gas and Electric Employees' Club. Other speakers were H. Von Vittenhoff of the Stone & Webster Management Association, and J. J. Heffernan and J. H. Rickard, Woonsocket attorneys for the company. The club's quartet entertained with songs and other members gave humorous and other selections. Mr. Royce talked on "Finance."

IT is planned by the Riverbend Gas and Water Company, which has been granted a franchise by the city of Reedley, Cal., to supply the city with gas by June 20. Work of laying a line from the Dinuba plant will start at once, and gas will be supplied from there until the new plant at Parlier is constructed.

AT a stockholders' meeting of the Spokane Falls (Wash.) Gas Light Company five trustees, Henry L. Doherty, Frank W. Frueauff, Charles T. Brown, Robert R. Choate and Harry Warner, were chosen. The officers of the Company will be elected by the trustees.

"A. M. J.," writing from Waterville, Me., says: According to a recent statement made by Superintendent Caldwallder of the Kennebec Gas and Fuel Company, more than 5 miles of mains will be laid in the city during the coming summer. This means about 30,000 feet of gas mains to supply the homes in the residential section of the city. There has been an increasing demand for gas for lighting and cooking purposes during the past few months, and it is to supply this demand that the new pipes will be laid. Men are now at work on Elm and Spring streets putting in mains.

THERE were 77 present at the third annual banquet of the Pittsfield (Mass.) Coal Gas Company. Manager H. C. Crafts presided, and Gronan's orchestra furnished music. Those present iucluded officials and employees of the company from the president down. The principal speaker was Lucius Bigelow of Buffalo, N. Y., who gave an instructive talk on good service. President W. L. Adam of the company spoke briefly, urging the worth of being able to do one thing well. Treasurer H. A. Dunbar spoke, as did Horace Trego, president of the Gas Gompany Employees' Association, who referred to the interest the company takes in the employees, and urged that the employees return this interest by doing good work.

FIFTY members of the Office Men's Business Association of the Denver (Col.) Gas and Electric Light Company attended the annual banquet of the association, held in the Metropole Hotel. Speeches extolling the work done and the progress made by the association during the last year were given by C. M. Elliott, manager of the contract department of the gas company and John Mulvihill, chief clerk.

THE Utah Gas and Coke Company will compete with the Utah Power and Light Company for furnishing street lights in Salt Lake City. The commissioner of streets and public improvements has a communication from the gas company saying that, understanding the city will create some special lighting districts in the business section, the company wished specifications to be drawn so as to give it an opportunity to bid on the lights.

WORK has been commenced by the Pacific Gas and Electric Company on a modern 8-story office building at the corner of Sutter and Powell streets, San Francisco. The new structure, which is to cost about $150,000, will be connected to the building on adjoining property now occupied by the company, and will be used by the Pacific company's organization exclusively. Expansion of business and a desire to concentrate the staff of the company are the reasons given by Mr. John A. Britton, vice-president and general manager, for erecting the new structure.

IN a communication from Marshall Milton, Manager of the Roanoke (Va.) Gas Light Company, to the common council, Mr. Milton calls attention to the fact that the new city hall is not equipped with gas pipes. "I don't know whether the gas company will get a foot of gas pipe in the new municipal building," he said, "but I feel it my duty to call your attention to the fact that no provision is being made for such pipes. It is ridiculous not to have gas pipes in a building as large as the new city hall. I can take you to any of the larger cities and show you that their best buildings are equipped with gas pipes."

I. IRVING EDGERLY, Chairman of the Water and Sewer Commission of Swampscott, Mass., and Superintendent of the Construction Department of the Lynn Gas and Electric Company, died last week in a private hospital in Lynn, following an operation which was

performed for liver trouble. He was born in Stratford, N. H., in 1860, and came to Swamscott in 1887, and for many years was in the contracting business. He was twice elected Superintendent of Highways in Swamscott. In 1907 he was elected a member of the Swampscott Water Commission and when the board was consolidated with the board of sewer commissioners he remained as a member of the joint commission. Mr. Edgerly was a member of the Masons, Odd Fellows, Red Men, Knights of Pythians and several clubs. He is survived by a widow, one son, Lloyd I. Edgerly, his mother, Mrs. Susan M. Edgerly, and one brother, Charles B. Edgerly, all of Swampscott.

BECAUSE of the trouble Waycross, Ga., has had with gas franchises the question of the city refusing to grant any further concessions to promoters, and instead arranging to erect and operate a municipal plant is now being investigated. There is one franchise still alive on which only a few of the conditions have been met. This franchise has a forfeiture that it is feared the city cannot collect. Suit is now pending in the courts here in an effort to collect the bond given by other promoters who fell down. Another application that has been filed with city council asking for a 33 year franchise under practically the same conditions as other franchises granted, excepting that a cash bond of $1,000 is offered in place of the guaranty bonds heretofore executed but never collected.

AT a meeting of the fire prevention committee of the Chamber of Commerce of Lynn, Mass., the advisability of having gas meters outside of buildings was discussed. The committee believes meters should be placed on the outside of buildings so the gas supply could be easily cut off in case of fire.

THE Penn Yan (N. Y.) Gas Light Company is preparing to lay new pipes along Elm street before the work of improving that thoroughfare is commenced. The pipes have arrived, and are now being placed along the street preparatory to installing.

THE Rotary club of Bloomington, Ills., at its last luncheon had the pleasure of listening to Mr. George B. Tripp, vice-president and general manager of the United Gas and Electric Corporation, the parent company to the Union Gas and Electric Company. Mr. Tripp was making a tour of inspection of their properties in 25 or 30 cities, and talked of the relation of a utility to the public. He told some personal experiences and commented on the financial conditions as decidedly on the upward trend wherever he had been.

AFTER being closed down since January the Elgin (Ill.) gas plant has been again started up and will be continued in operation for about six weeks, in order to allow the Western United Gas and Electric Company opportunity to repair the damage caused by fire at the Joliet plant eighteen months ago. Since the completion of the large holder in the south end of the city the territory north, as well as Elgin, has been supplied from Joliet.

A DISPATCH from Kalamazoo, Mich., says: While Mayor Balch and the engineering committee of the council are not in a position to make public the contents of the cablegram received from William Newbigging, British gas expert, concerning the cost of a system of gas mains, the answer to the query is considered entirely satisfactory. According to Newbigging's report a new plant complete, including mains and extensions, would cost the city approximately $975,000. The mains, which are considered one of the biggest expenses of the undertaking, can be installed over the entire city at a very reasonable figure, according to the British expert's estimates.

THE Manchaster, N. H., "Mirror" says: "As the business of the post office and increase in the number of service pipes of the water department are barometers of the growth of a town or city, so the multiplication of the number of meters of the gas company can also be taken as an unfailing indication of progress and development in population. In 1891 the Peoples Gas Light Company had 3136 meters installed, and at the beginning of this year the number had been increased to 12,211. The same ratio is shown in the number of service pipes. They were 1882 in 1892, and at the beginning of the present year this number was 7081. And while this growth has been going on the price to the consumer has been decreased from $1.50 per 1,000 cubic feet to a flat rate of $1 per 1,000 cubic feet. Surely Manchester people can contemplate with pride and satisfaction the many unfailing evidences of the city's forging ahead.

UTILITIES COMMISSION NEWS.

TRANSFER OF FRANCHISE.—The up-State New York Public Service Commission has approved the transfer of franchises granted by the town and village of Southampton, Suffolk County, from Henry F. Cook to the Long Island Gas Corporation, and permits the company to construct a gas plant and lay mains and pipes in the town and village under these franchises. The commission previously approved similar franchises, but they expired due to time limitation, necessitating the new proceeding. The proceeding was duly advertised in the territory affected, and no opposition to the approval has been recorded.

MAY NOT ADD BILLS TOGETHER TO GET RATE.—The Oregon Railroad Commission in the application of the Oregon Power Company for an interpretation of Section 63, Public Utilities Act, 1911, ch. 279, has made the following decision:

"An electric utility which has filed tariffs showing its rates in several distinct localities, upon a block-rate plan whereby a lower rate is secured by increased quantity consumed, may not lawfully contract with a single user who desires to be served in different localities, that the aggregate amount of his consumption shall be taken and a single bill be rendered thereon, in order that the total charge made may be less than if the consumption from each user served by a single distribution system were separately computed at the tariff rate applicable in that locality. Such practice would immediately result in an undue preference to the consumer and an unjust discrimination against other patrons receiving a like and contemporaneous service under substantially similar circumstances."

CALIFORNIA COMBINATIONS.—The California Commission has issued an order authorizing P. J. Dubell, trustee, to transfer the properties of the San Bernardino Valley Gas Company, comprising two gas plants in Redlands and one gas plant each in San Bernardino, Corona and Colton, to the Citrus Belt Gas Company. The order also provides that the Citrus Belt Gas Company may assume the mortgaged indebtedness of the subsidiary companies comprising the San Bernardino Valley Gas Company in the sum of $350,200 and issue 2,000 shares of stock of the par value of $100 per share.

The Citrus Belt Gas Company is also authorized to execute a supplemental indenture for the purpose of extending the lien of the bonds of the Home Gas and Electric Company of Redlands of a total amount not to exceed $200,000 to cover all the properties to be acquired by the Citrus Belt Gas Company, subject, however, to outstanding bonded indebtedness.

WON'T LIMIT COMPETITION.—The Ohio Legislature has defeated a bill proposing to extend to all public utilities the provision of the telephone law that a new corporation cannot be given a franchise to compete with an established company unless it obtains a certificate of public necessity from the State utilities commission.

CANNOT REFUSE SERVICE BECAUSE OF OLD BILL AGAINST PREMISES.—According to a ruling by the New Jersey State Board of Utility Commissioners, water companies cannot hold purchasers of property liable for bills contracted by former owners. The case was brought to the attention of the Board by a West Orange resident, who stated that he had been notified by the local company that the back bill must be paid or the supply of water would be shut off, and that he had paid the amount claimed rather than be inconvienced by such action. The Board, in its decision, stated that it was without authority to compel the water company to refund the amount paid and recommended that a suit at law be instituted to force reparation. Gas companies in some places have a rule in force of similar nature and the decision will affect them.

PUTS OIL INDUSTRY IN PUBLIC UTILITIES.—A bill in the California legislature proposes to put the oil producing industry under the jurisdiction of the State Railroad Commission. Section 2 says:

"The railroad commission of the State of California is hereby vested with power and authority, and it is hereby made its duty, to establish rules and regulations, to conduct investigations, and to hear and determine all questions of fact, and to make and enforce all decisions and orders necessary or proper for the determination and the prevention of such waste and for carrying into effect the provisions of this act. The commission may, by rules and regulations or orders, limit the production or the storage of crude oil or petroleum, in such manner and to such extent as shall be just and equitable, and without discrimination."

Financial Notes.

MASSACHUSETTS LIGHTING COMPANIES shareholders have received notice that the Light, Heat and Power Corporation will discontinue its engineering and construction departments. This change in policy, it is stated, will have little or no effect on the net earnings and no effect on the intrinsic value of the stock, all of which is owned by the Massachusetts Lighting Companies. Since July, 1904. the Light, Heat and Power Corporation has done the engineering and construction work made necessary by the important additions and improvements to the plants and distribution systems of the gas and electric light companies whose shares are owned by the Massachusetts Lighting Companies. These larger improvements have put the plants in excellent physical condition, and they are now in a position to do their own construction work economically and furnish a greatly increased number of customers. The operating companies have made several price reductions in the last year, which, together with general business conditions, caused a decrease of less than 1% in gross earnings for the eight months ended March 1, 1914. Some of the companies have already gained enough new business to make up for the reductions and the others are making rapid progress.

PERMISSION has been granted the PEOPLES GAS LIGHT AND COKE COMPANY by the Illinois Public Utilities Commission to issue $73,000 in stock for sale among its employees. The stock is to be sold at $100 a share. The commission also will allow the company to issue $300,000 in bonds for payment of an underlying bond which comes due in July.

IT is understood that negotiations are under way by which Bodell & Co. of Providence and Boston will acquire from the UNITED GAS AND ELECTRIC COMPANY of New Jersey, a subsidiary of the United Gas and Electric Corporation of Connecticut, all its holdings of the common stock of the HARTFORD GAS LIGHT COMPANY. The Hartford company has $750,000 8% preferred stock and $1,250,000 common stock outstanding, of which United Gas and Electric Company owns 1.92% of the preferred and 71.36% of the common. It also has outstanding $600,000 first mortgage 30-year 4% bonds due in 1935. In 1914 the company is understood to have paid 14% in dividends on the common stock and to have averaged 13% in dividends on this issue for several years, with an uninterrupted dividend record since its organization in 1848.

THE BROOKLYN (N. Y.) UNION GAS COMPANY'S balance sheet as of December 31, 1914, shows that the system's gross property investment exceeds the entire aggregate capitalization by more than $14,000,000. That the corporate profit and loss surplus is more than one-fifth of the aggregate capitalization and that cash on hand and free investments approximate $3,200,000. In other words, for every dollar of stock and bonds in public hands there is $1.42½ of property. For every dollar of stock and bonds outstanding there is a profit and loss surplus of 20 cents. For every dollar of stock and bonds outside the company's treasury there is 10 cents cash on hand or securities easily convertible into cash.

WHEN the PACIFIC GAS AND ELECTRIC COMPANY pays off the $1,500,000 notes on May 27, it will have cleared up the last of its floating debt, and will have no further short term obligations outstanding. The payment will also release $5,000,000 general lien 6% bonds and $2,000,000 general and refunding 5% bonds. The general lien bonds and the indenture securing them will be canceled and the other issue will be returned to the treasury and will be available for corporate purposes.

SUBSIDIARY corporations of AMERICAN GAS AND ELECTRIC COMPANY continue to make gains, and while no monthly reports of earnings are made public by the holding company, it is said that earnings for its common stock are running between 19% and 20% on the $3,641,400 outstanding. The expectation that the company will this year declare the same dividends as in 1914, or 8% in cash and 7% in stock, has aided in advancing quotations, and it is expected that a 2% stock dividend will be declared in the near future in addition to the regular quarterly cash dividend of 2%. The new business departments in eighteen of the communities served reported in March, 1915, 1,740 contracts closed, as against 1,495 in March, 1914; while the guaranteed yearly revenue for the contracts in March, 1915, was $73,942, as against $65,873 on the contracts taken in March, 1914. For February, 1915, there was an increase of 10.3% in gross of all subdiaries over February, 1914, with an increase of 13.1% in operating expense, a gain of 8.5% in net earnings, and an increase of 13.7% in combined surplus after charges.

AT the annual meeting of the UNITED GAS IMPROVEMENT COMPANY Samuel T. Bodine was re-elected president and the following directors chosen for the year: Randal Morgan, Rudulph Ellis, William Wood, Morris L. Clothier, Effingham B. Morris and Thomas J. Dolan. President Bodine called the meeting to order and nominated C. Stuart Patterson presiding officer and G. W. Curran secretary of the meeting. The annual report was presented and adopted, and the minutes of the previous meeting were read and approved. Only about fifty stockholders were present, but 756,240 shares were voted out of a total of 1,110,059 shares. After the shareholders' meeting the directors met for organization, re-elected the officers of the company and, in addition, made I. W. Morris treasurer to relieve Lewis Lillie, who has been filling the offices of both vice-president and treasurer.

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